FOOD MANUFACTURE

Incorporating Food Industries Weekly

A PUBLICATION OF THE LEONARD HILL TECHNICAL GROUP DECEMBER 1, 1956

Department Food Technology
University of Massachusetts
Amherst, Massachusetts
DEC 27 1956

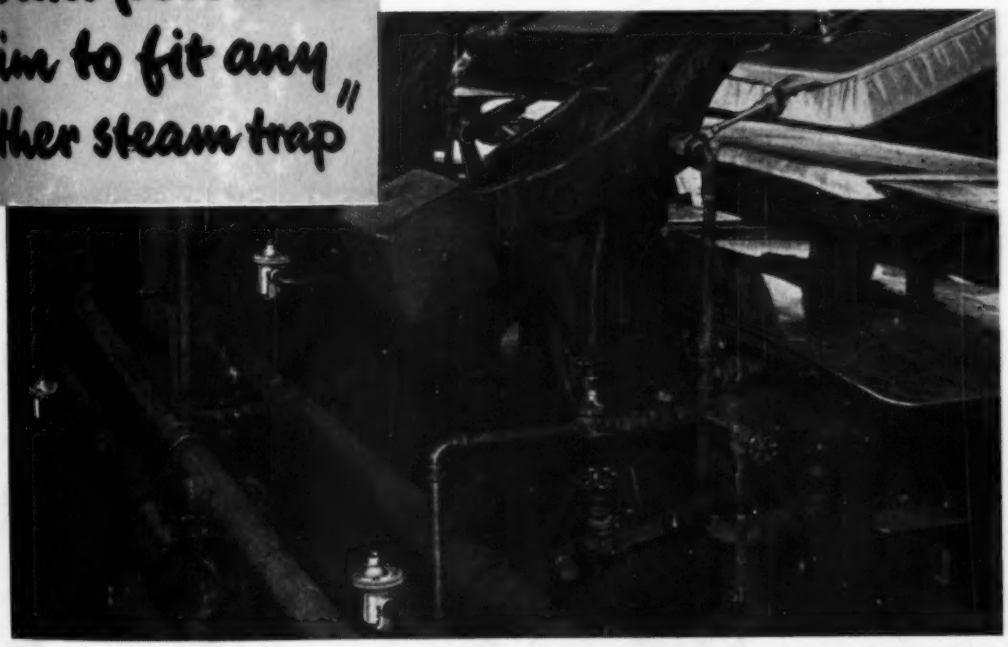
UNIVERSITY OF MASSACHUSETTS

NO salesman in the world could persuade him to fit any other steam trap"

Representative's Report No. 31775.

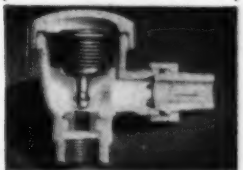
"Mr. M. . . . informed me he has had an installation of Drayton-Armstrongs running for twenty years now, some thirty D/A 200's. This was the first D/A job he did and to keep his eye on the condensate he fitted the condensate return to the hot well at a very prominent position. He sees it frequently and it is running exactly as the day he started it up with no sign of steam in it. Not one of these traps have been opened in the twenty years. He says no salesman in the world could persuade him to fit any other trap."

Drayton-Armstrongs stand in a class by themselves for long life and trouble-free operation. . . . No outlay on servicing, no renewals, no loss in efficiency though nothing has had to be paid out on maintenance. The unique free-floating lever system, combined with an exceptionally high material and manufacturing specification, ensure a trapping performance over the whole of the long life of the Drayton-Armstrong which cannot be bettered by any other trapping system.



The Drayton-Armstrongs installed on the presses in this famous Scottish undertaking.

The 'Drico'
BALANCED PRESSURE TRAP



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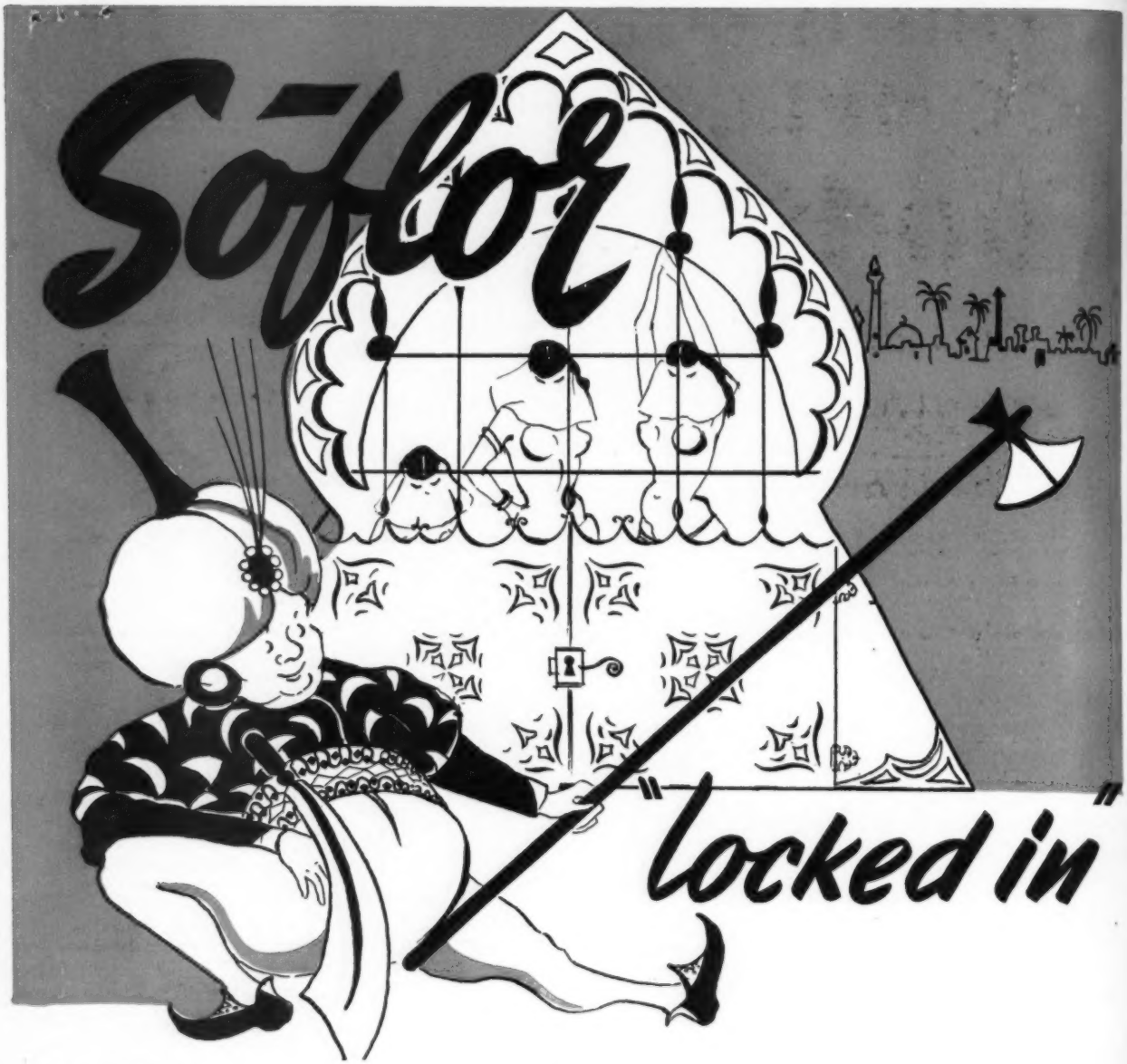

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The expert knowledge of Mr. Helmut Hilgeland on all phases of sausage-making, meat curing, canning and factory layout binds the Foodtech Service into a complete whole. Mr. Hilgeland is always glad to give advice. All enquiries are treated as personal and confidential and should be addressed to Mr. Hilgeland, Managing Director, Foodtech Limited, at the address below.

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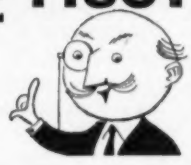

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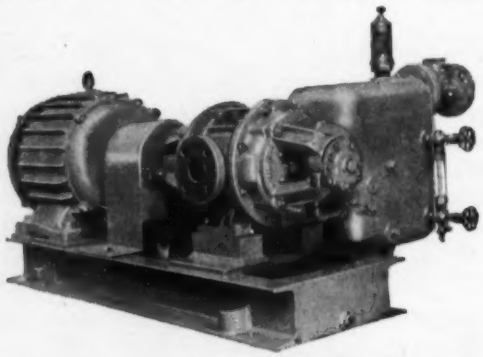

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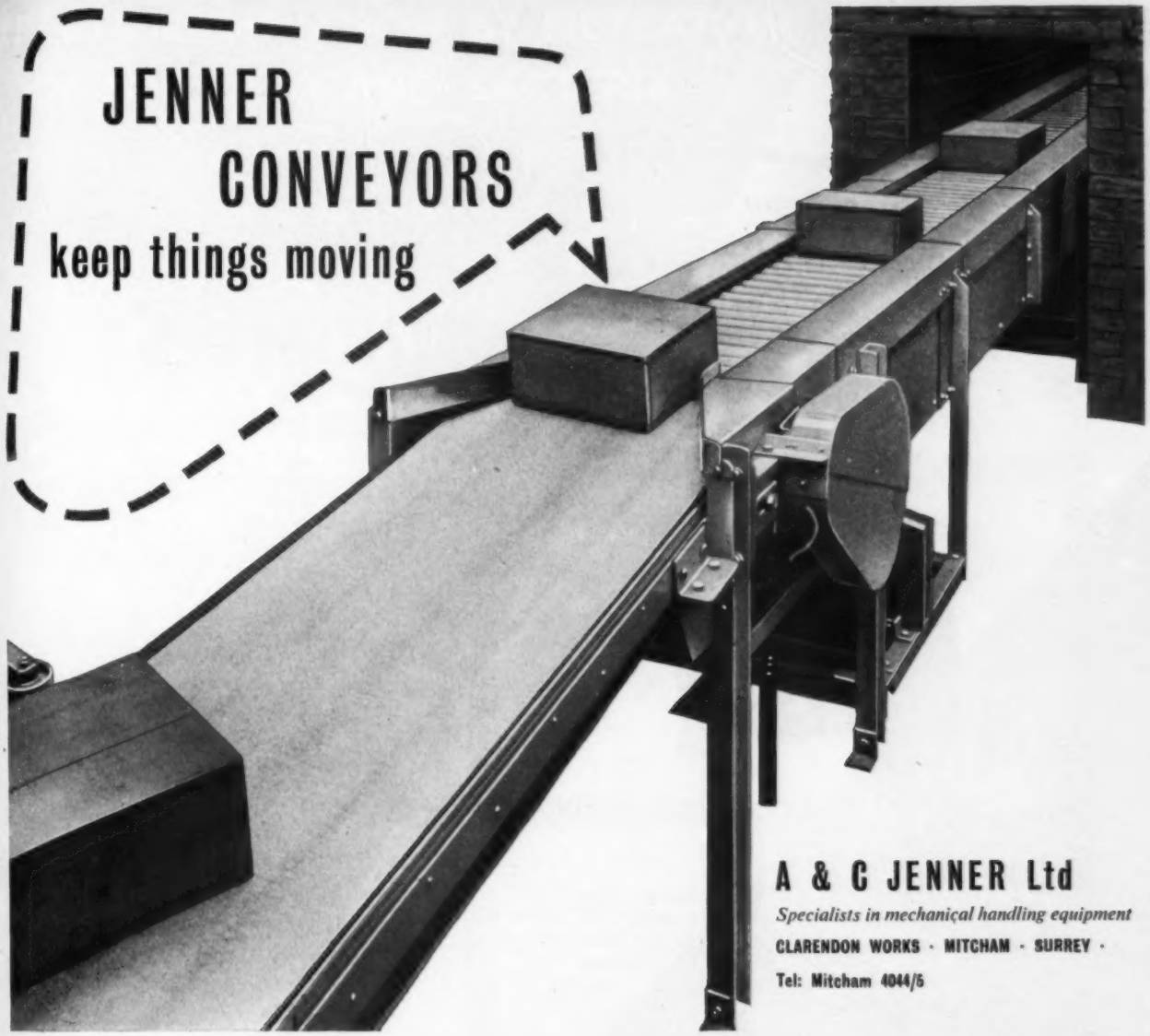

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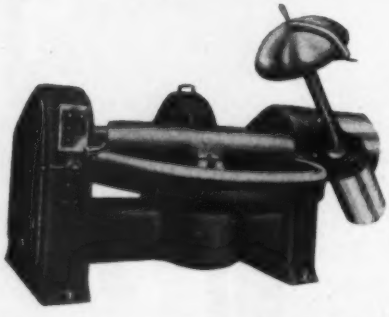

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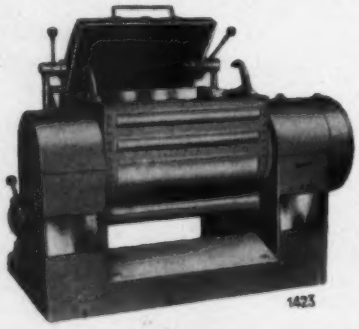

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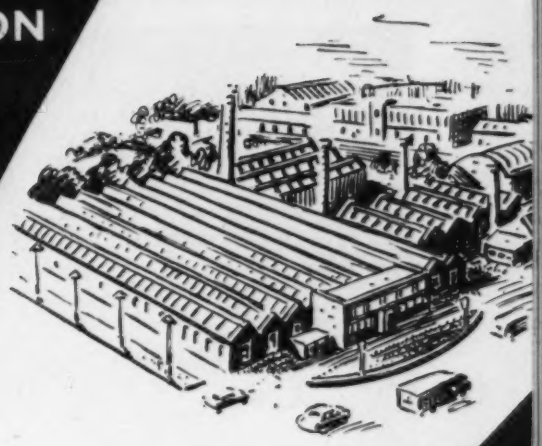

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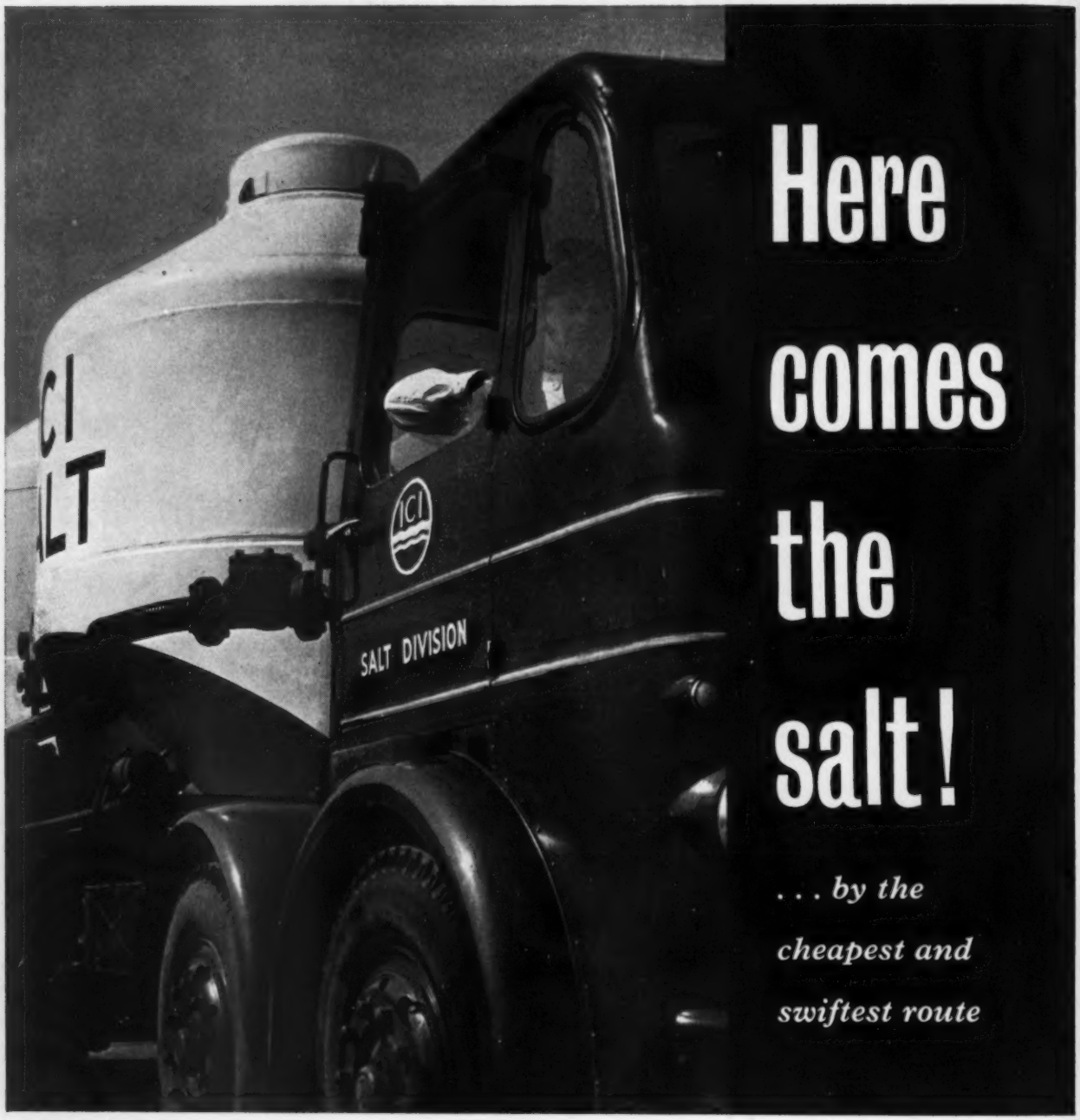

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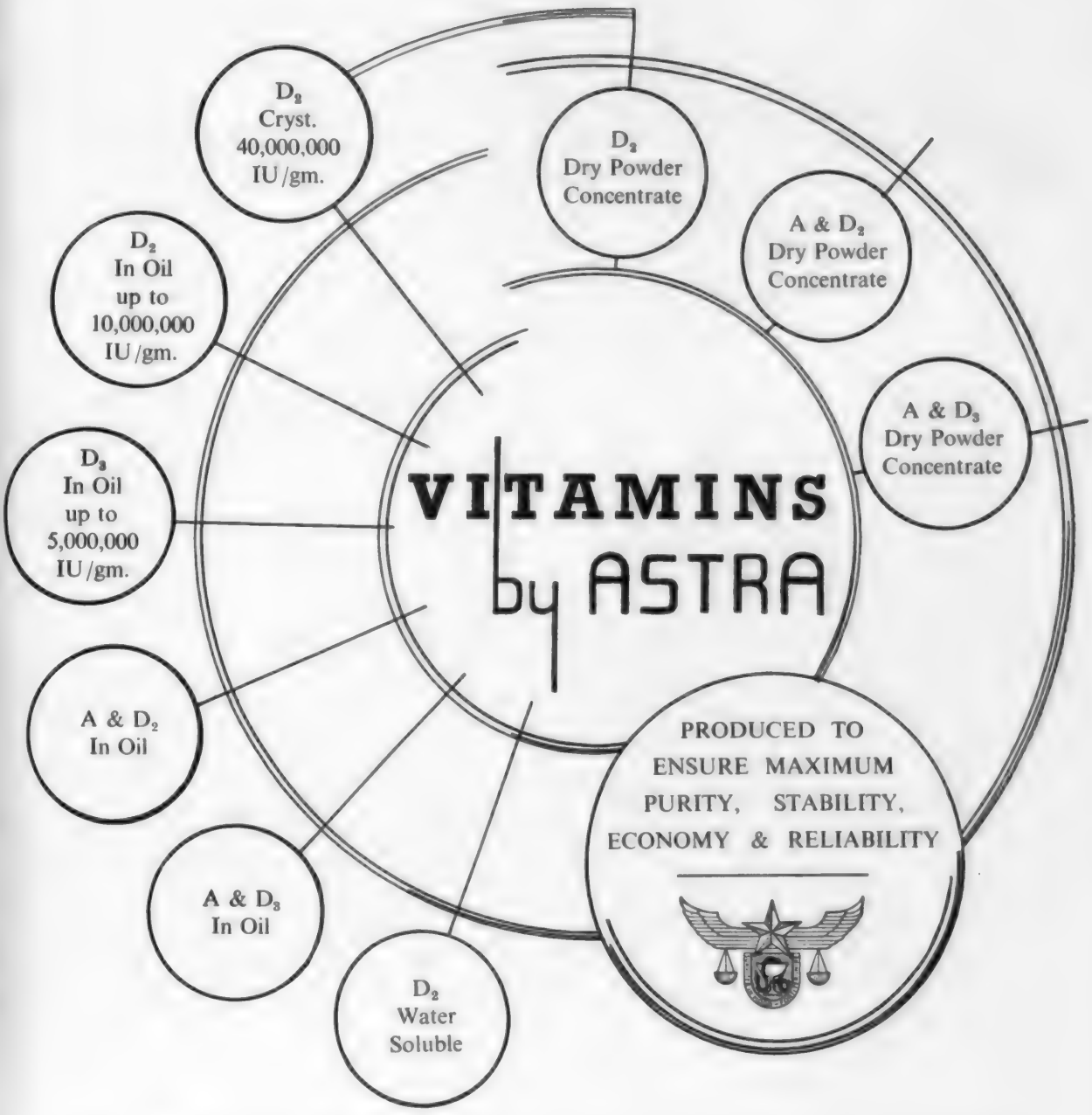

D₂ Cryst. 40,000,000 IU/gm.
D₂ Dry Powder Concentrate
A & D₂ Dry Powder Concentrate
A & D₃ Dry Powder Concentrate
D₂ In Oil up to 10,000,000 IU/gm.
D₃ In Oil up to 5,000,000 IU/gm.
VITAMINS by ASTRA
A & D₂ In Oil
PRODUCED TO ENSURE MAXIMUM PURITY, STABILITY, ECONOMY & RELIABILITY
A & D₃ In Oil
D₂ Water Soluble

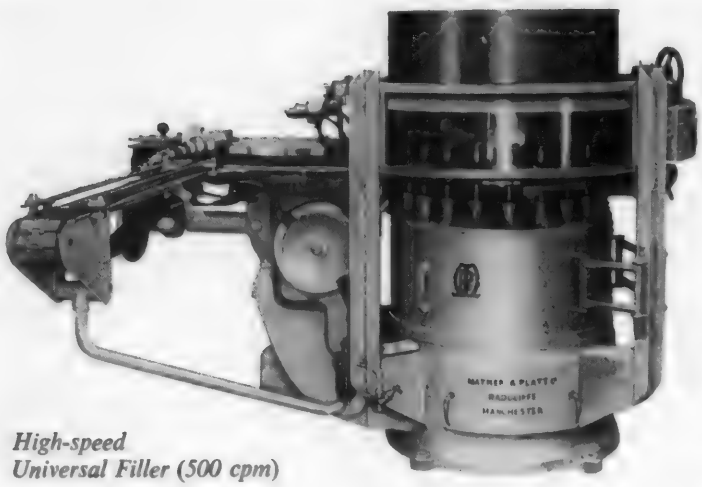
— IN BULK OR IN PRE-MEASURED BATCH CONTAINERS —

ASTRA CHEMICALS LIMITED

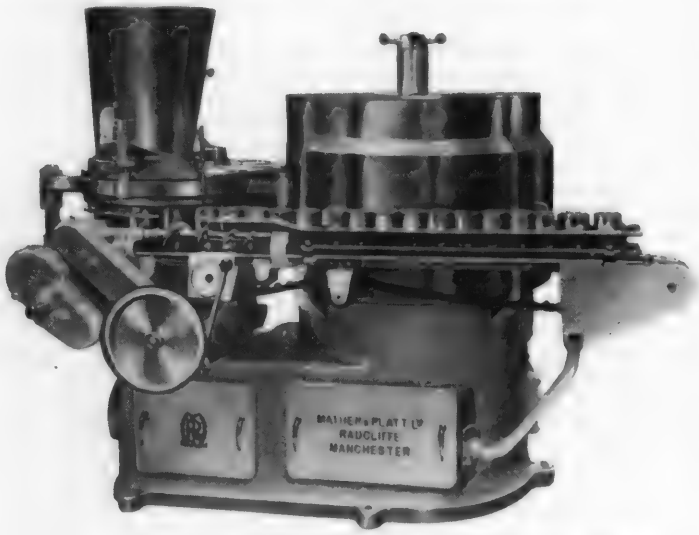
VITAMIN D TECHNOLOGISTS

NORTH PETHERTON · BRIDGWATER · ENGLAND

TELEPHONE: NORTH PETHERTON 262 TELEGRAPHIC: ASTRA, BRIDGWATER



High-speed Universal Filler (500 cpm)



High-speed Solid and Liquid Filler (300 cpm)

A10 Can Filler (30 cpm)

MODERN FILLING MACHINERY

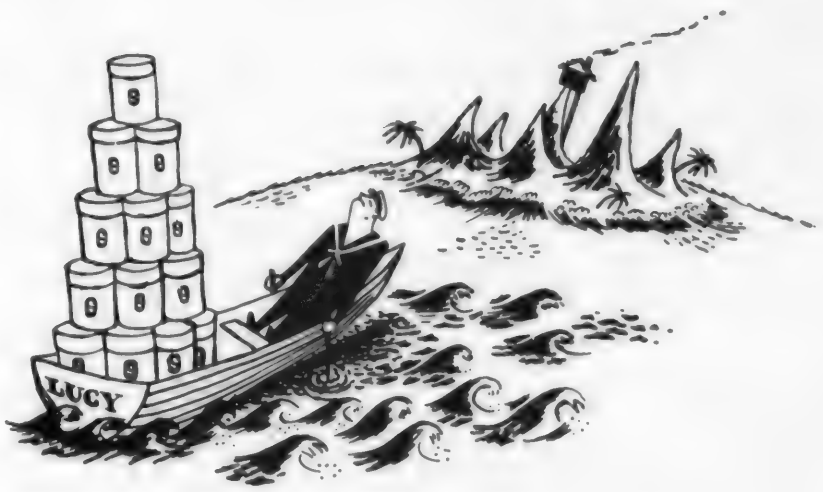
These modern machines are part of a new and complete range of designs by Mather & Platt Ltd for the canning industry.
They combine a high degree of accuracy with high speed and simple and economical maintenance.

Mather & Platt
LIMITED

RADCLIFFE
MANCHESTER

606

FINE CITRIC ACID IN THE MAKING



Going out into the world

A mention of "going out into the world" had a remarkable effect upon our new artist — we may not have to fire him after all! Making allowance for artistic licence, he grasped more or less what we were driving at right away.

Sealed in airtight packs, proof against damp and contamination, Sturge citric acid is despatched to customers all over the world. The wide variety of purposes for which it is used is a tribute to its outstanding quality and purity. These uses include pharmaceutical and medicinal preparations, fruit squashes and carbonated beverages, sugar confectionery, jams and preserves, baby foods, ice cream and processed cheeses as well as in resins, plasticisers, paints, inks, photography, dyeing, calico printing and electroplating.

Manufacturers of fine chemicals since 1823

STURGE

CITRIC ACID BP

CITRIC ACID ANHYDROUS

JOHN & E. STURGE LTD · WHEELEYS ROAD · BIRMINGHAM, 15 · TEL: MIDLAND 1238

Have you asked LACY-HULBERT?

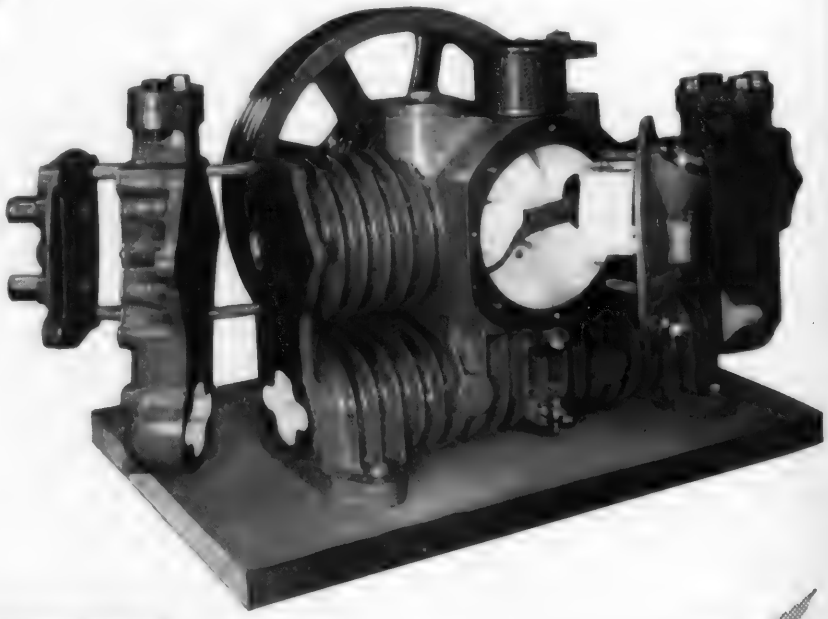
*

For vacuum testing, de-aeration prior to impregnation, distillation of fluids, pre-storage drying, evaporation of water or other solvents.

ask them about the

CXB VACUUM PUMP

The CXB is a two-stage air-cooled dry vacuum pump capable of maintaining for long periods a vacuum of better than 29½" Hg. Leaflet CXB3.



As specialists in the design, manufacture and performance of air compressors and vacuum pumps, Lacy-Hulbert can help with your problems of application and installation —and supply individual accessories or a complete plant.

LACY-HULBERT & Co. Ltd
BOREAS WORKS · BEDDINGTON · CROYDON
PNEUMATIC ENGINEERS — ESTABLISHED 1901
TELEGRAMS "PERCUSSIVE, CROYDON" TELEPHONE CROYDON 5504/7

*

they have the pneumatic 'know-how'!

Butterfields meet your needs in STAINLESS STEEL EQUIPMENT

THE BEST WORKING AGREEMENT is the one which obviates interference; stainless steel is an impeccable partner in such an agreement because as a container of liquids or powders it has no action whatsoever on its contents . . . nor have they, upon its hard, sterile, polished surface. Butterfields are constantly at work in Stainless Steel for all manner of processing and storage requirements for the Food Industry: Tanks, Vats, Vacuum and Pressure Vessels, Boiling Pans, Tilting Pans, etc., etc.

Inset shows highly polished interior of Tilting Pan

Butterfield

STAINLESS STEEL EQUIPMENT

W. P. Butterfield Limited P.O. Box 38 Shipley Yorkshire Tel 52244 (8 lines)

Branches: LONDON Tel HOLborn 2455 (4 lines) BIRMINGHAM Tel EAS 0871 BRISTOL Tel 26902 LIVERPOOL Tel Central 0829 MANCHESTER Tel Blackfriars 9417 NEWCASTLE-ON-TYNE Tel 23823 GLASGOW Tel 7696 BELFAST N.I. Tel 57343 DUBLIN Tel 77232

Two heads are better than one . . . so send that flavouring problem to the

BOEHM EXPERIMENTAL KITCHEN

As acknowledged experts in the field of food flavouring it is possible that we have the answer to your immediate flavouring problem. If not, the Boehm Experimental Kitchen will get to grips with it and do its best to find a solution. This service is absolutely free and, needless to add, is becoming more and more popular with manufacturers. Incidentally, many products today owe a great deal to the shrewd advice and technical help of Fredk. Boehm Ltd. Why not put your problem in the post to them NOW?

FREDK. BOEHM LTD., 19 BENTINCK STREET, W.1 Telephone WELbeck 7933

FREDK. BOEHM LTD., CONTINUES TO SUPPLY

AJI-NO-MOTO
Mono-sodium glutamate 99% pure.

YEATEX
Autolysed Yeast Extract.

PROTEX
Hydrolised Protein.

COMMER

Superpoise

2-5 TON PETROL AND DIESEL TRUCKS

with 'full-view' 3-seat comfort cabs and optional overdrive

DESIGNED for economy, built for reliability, 'Superpoise' 2-3, 3-4 and 5 tonners embody insulated three-seater cabs of welded steel together with improved steering & suspension. In addition, a range of factory-built bodies containing a high proportion of steel is offered, as well as an optional overdrive for extra economy.

Built stronger to last longer!

ROOTES PRODUCTS

COMMER CARS LTD LUTON EXPORT DIVISION: ROOTES LTD. DEVONSHIRE HOUSE PICCADILLY LONDON W.1

Liquid process control by **MEASUREMENT**

1½" S 7. stainless steel meter with screw on flanges and 12" vertical index.

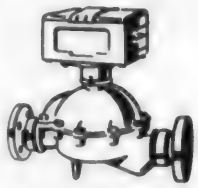
When you require to measure bulk or batch quantities of edible liquids, oils, spirits and solvents, hot or cold water, we can supply meters with summating, resettable, electrical presettable, direct reading or pointer type index attachments (as illustrated) and control equipment.

MEASUREMENT

INDUSTRIAL **LIQUID** *METERS*

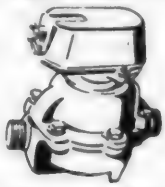
(A COMPANY OF THE PARKINSON & COWAN GROUP)

MEASUREMENT LTD. HYDRAULICS DIVISION
119 Union Street, Oldham, Lancs. Telephone: Main 6432.
LONDON: TERMINAL HOUSE, Grosvenor Gardens, London, S.W.1.
Telephone: SLOane: 0111.

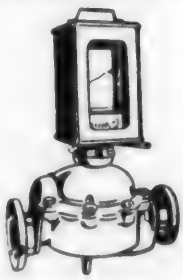


BOX TYPE COUNTER
Re-settable batch-dispensing counter with 7-digit cumulative total register.

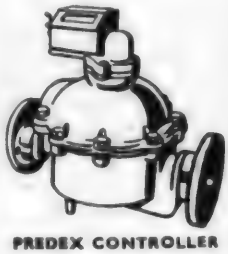
6" VERTICAL RE-SETTING INDEX
Can also be used to pre-set a determined quantity, with electric trip to operate solenoids, pumps, warnings, etc.



ZEROSET INDEX
Simple turning motion re-sets indicator to zero.



MECHANICAL RECORDER
Gives a graphic record on 6" x 12" chart; suitable for 4 hour, 8 hour, 1 day, 7 day periods.

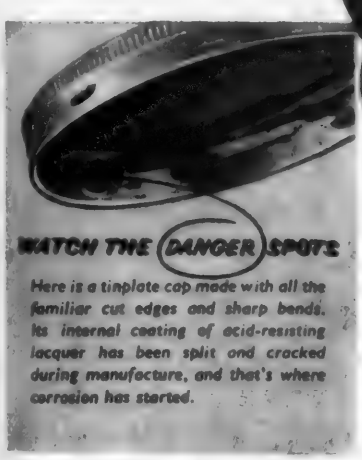


PREDEX CONTROLLER
Automatic means for continuous dispensing of fixed quantities of liquids.

New! — a *non-corrosive*

tinplate screw cap for pickle jars

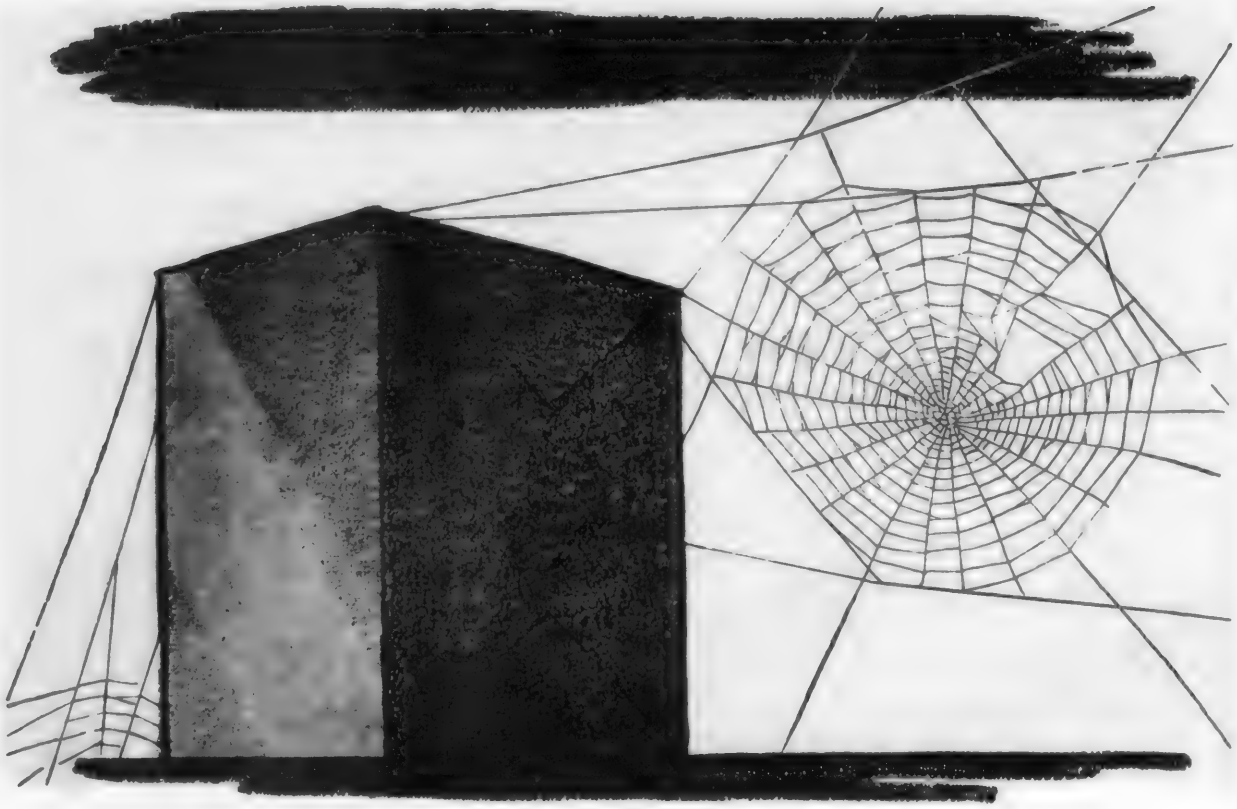
by Metal Box


WATCH THE DANGER SPOTS
Here is a tinplate cap made with all the familiar cut edges and sharp bends. Its internal coating of acid-resisting lacquer has been split and cracked during manufacture, and that's where corrosion has started.

Metal Box have overcome corrosion, the worst enemy of all tinplate pickle caps. This new style cap has two distinct advantages over previous types—it is made by a new manufacturing process which minimises damage to the internal coating, and the coating itself is tougher, more elastic, more resistant to pickle acids. The design eliminates the knurl completely, and the smoothly operating thread does not disturb the coating when the cap is screwed on to the bottle. All the danger spots where corrosion normally starts are completely absent. The wad rotates freely in the cap to ease removal, and the whole cap looks clean and stays clean. This new Metal Box pickle cap combines the strength and low cost of a tinplate cap, yet is non-corrosive too!

THE METAL BOX COMPANY LIMITED The Langham · Portland Place · London W.1

Metal Containers · Paper Products · Flexible Packages · Plastic Films and Laminations



Yet it's factory fresh the day that it's opened!

WE ARE EXHIBITING AT THE
Packaging Exhibition
22 Jan.–1 Feb. 1957
National & Empire Halls
OLYMPIA
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STAND No. 7 Row C

Put your product in a Telcothene package—and it's safe from bad storage. Safe from dirt and damp. Safe from chemical contamination. And safe for a long long time.

Telcothene coated papers make perfect hermetically sealed inner wrappings for foodstuffs and perishable goods. In addition their toughness makes them very suitable for use in the manufacture of moisture proof outers, as instanced by multiwall paper sacks, fibre board drums, cartons and similar containers. The cost is not high; the results in terms of prestige and customer goodwill are rewarding indeed.

Look into this Telcothene business—your converter will be able to prescribe its place in your packaging department; or write direct to us, our technical department is at your service.

..it's Telcothene packed!

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THE TELEGRAPH CONSTRUCTION & MAINTENANCE COMPANY LTD
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COATED PAPER

TELCON

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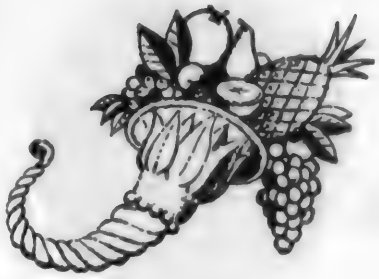

Vantoc AL

A reliable steriliser

Vantoc AL is of interest to all manufacturers of soft drinks. It is a surface-active quaternary ammonium bactericide. It penetrates and destroys infection in mixing pans, syrupers, pipe lines, fillers and bottle stoppers. Its solutions, which may be applied hot or cold, are odourless, non-corrosive, non-toxic and safe to handle. Vantoc AL is highly effective against yeasts and a wide range of bacteria at the concentrations recommended.

Write for 'Surface Active Agents Leaflets' No. 6 and No. 22.

IMPERIAL CHEMICAL INDUSTRIES LTD LONDON SWI

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MALT EXTRACT

DRIED MALT EXTRACT POWDER

MALT FLOUR

An ever-increasing application to food industries

EDWARD FISON LIMITED

FACTORY CEDARS · STOWMARKET · SUFFOLK

Maltsters for more than a Century

CARTONS AND COMPOSITES

FOR THE FOOD INDUSTRY

Precision made for high-speed automatic filling

Each of these nationally known containers was produced by Metal Box and is the result of Metal Box 'know-how' at work.

Metal Box are expert at solving every type of packaging problem, whether it involves research into the reaction of contents with packaging materials, the examination of the effects of prolonged storage, or advising on filling or closing techniques. The result of using their specialist skills and experience is an exactly suitable container for each individual product. Metal Box 'know-how' serves the food industry well.

* *We invite you to visit us at Stand No. 2F 13 at the Packaging Exhibition, Olympia 22nd January—1st February*

Metal Box *'know-how'* at work for you

Design Service
Metal Box designers have hundreds of case histories to call on when planning your container.

Engineering Facilities
To advise on the installation and maintenance of high-speed filling and closing machinery at the end of your production lines.

Research
The largest laboratories in the country devoted entirely to research into packaging problems.

Marketing Intelligence
A world-wide service that studies marketing trends and can supply up-to-the-minute information in any consumer field.

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M03720

The

HYDRON

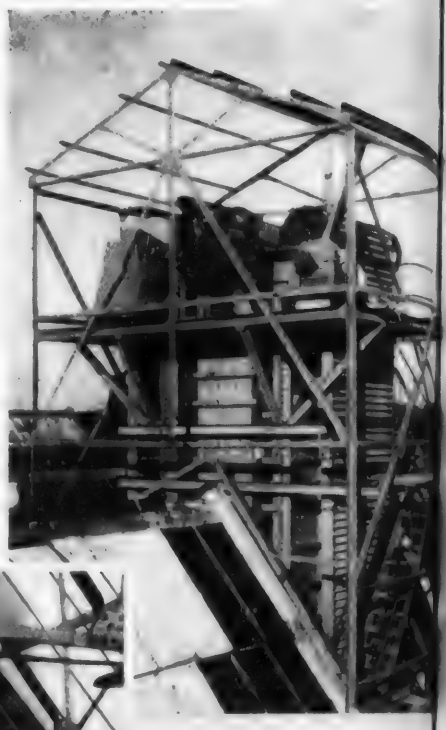
HYDROSTATIC STERILISER

DESIGNED and Manufactured by:

MITCHELL ENGINEERING LTD.

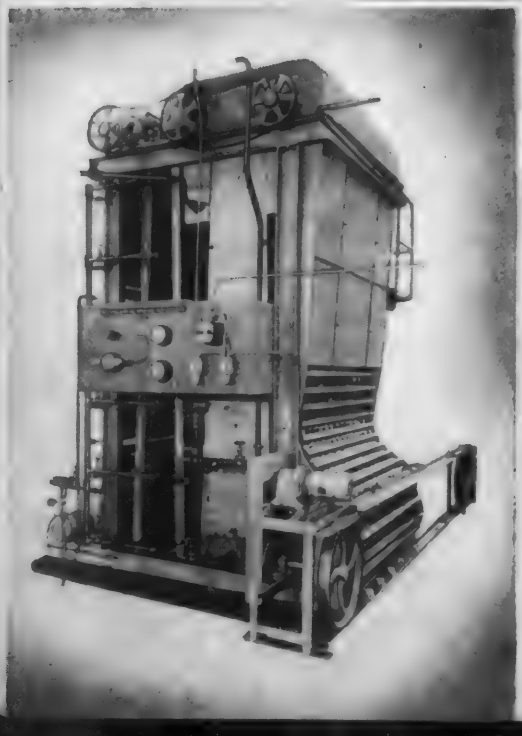
in association with:

R. W. WEBSTER & CO. LTD.



for fruit

for vegetables



THE MOST ADVANCED MACHINE OF ITS KIND HAVING AN OUTPUT OF UP TO 800 CANS PER MIN.

Installed by leading Canners in this country, and Australia, Switzerland, Belgium, Cyprus.

For full details write to:

Mitchell Engineering Ltd., Food Machinery Division, The Bridge, Peterborough.

R. W. Webster & Co., Ltd., Abbey Ironworks, Waltham Cross, Herts.

Designed to Sell

Designed to promote sales
of confectionery both
at home and overseas these
highly decorated metal containers
have the following advantages:

- ★ **Exclusive decoration**
- ★ **Suitability for the product**
- ★ **Variety of shapes**
- ★ **Variety of closures**
- ★ **Variety of sizes**
- ★ **Superb printing**

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If no single packaging material will do...

consider a LAMINATION by Metal Box

a LAMINATION is made by bonding together with adhesive two or more layers of different materials. The moisture-proofness of one may be joined with the strength of another and the appearance of a third. Variations can be made in relative thickness, and the possibilities are both numerous and exciting.

The knowledge of laminations possessed by Metal Box makes it worth your while to consult them first whenever you are considering whether a lamination may be the kind of packaging material best suited to your product. Write or phone *today* to

THE METAL BOX COMPANY LIMITED
Plastics Group
THE LANGHAM • PORTLAND PLACE • LONDON W.1

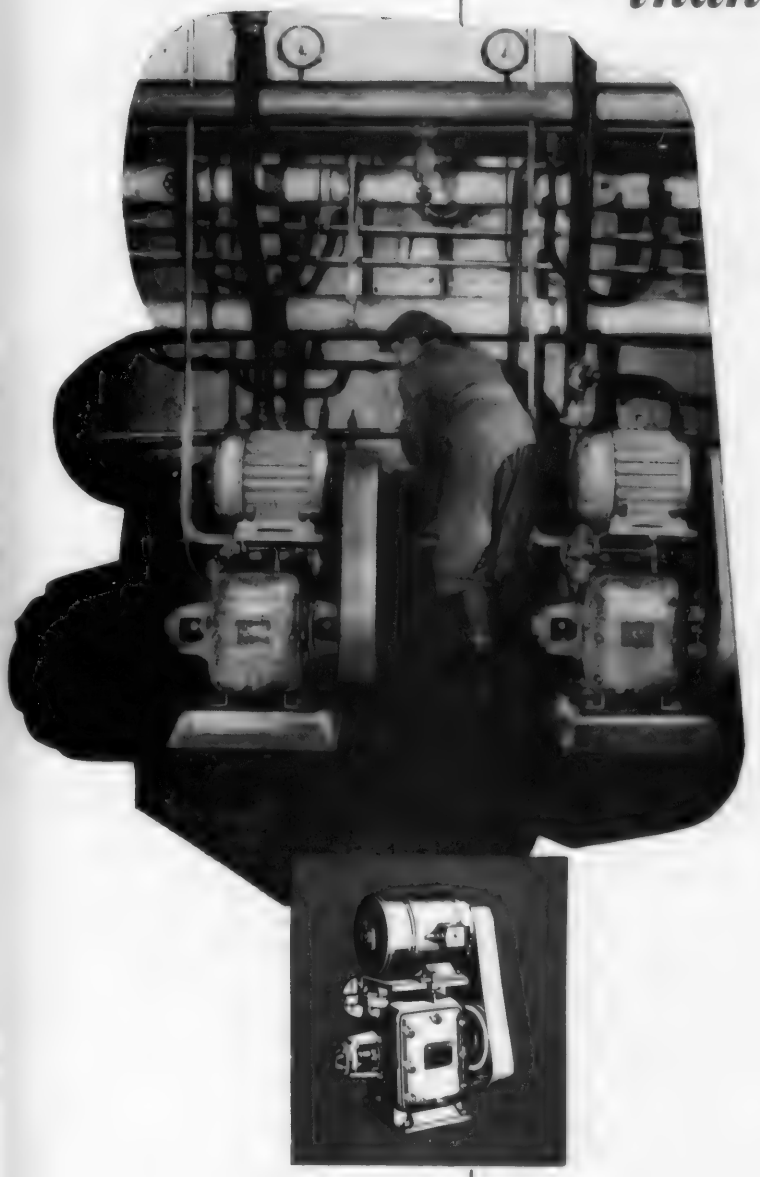
NESTLES use METALAM
for their successful Nescafé pack

METALAM is made of aluminium foil and transparent acetate film—lightweight, moisture-vapour proof, lightproof, tough, capable of being printed in multicolour under the acetate, which protects the printing and gives it a high gloss.

A LAMINATION may enable you to :

- SAVE space
- SAVE weight
- SAVE breakages
- SAVE waste
- Open new markets
- Try new sampling schemes
- Achieve new low-cost packaging

There's more in pumping than buying a pump



Megator's contribution goes far beyond supplying pumps. We were called in at the start of this job — to study the site and plant arrangement, pipework and control system. The result has been a fine installation and a satisfied customer. Megator engineers spend their lives solving other people's pumping problems and it is only common sense to call on that experience when you need it.

MEGATOR

SOME MEGATOR FACTS

***High suction lift** permits installation in convenient positions.*

***Self-priming** inherent without any added device.*

*"**Snoring**" ability sucks out the last drop.*

***Constant capacity** at varying pressures.*

***Sustained performance** Self-compensating for wear.*

***Simple.** Designed for easy maintenance.*

***Capacities** from 4 to 250 galls. per minute.*

MEGATOR PUMPS & COMPRESSORS LTD · 43 BERKELEY SQUARE · LONDON · W1 · Telephone: GROsvenor 6946

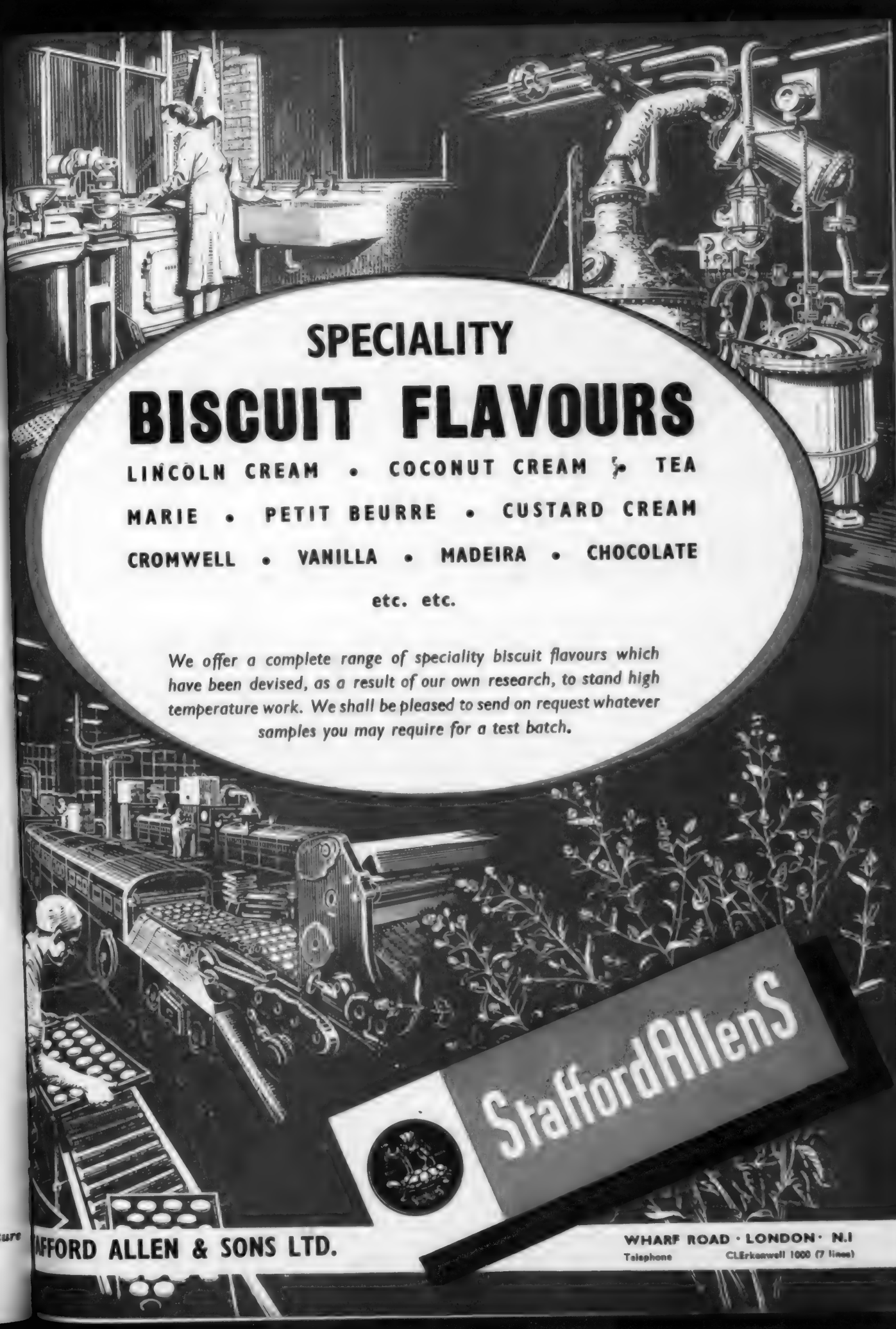
THE STEEL COMPANY OF WALES LEADS BRITAIN'S GROWING STEEL PRODUCTION

New blast furnace increases pig-iron capacity by over one-third

At the Abbey Works of The Steel Company of Wales, No. 4 Blast Furnace is now working at maximum capacity. Built last year, blown in this January, No. 4 Furnace has a hearth diameter of 29 ft. 9 in., the largest yet built by the Company. Its weekly output is over 10,000 tons of pig-iron.

No. 4 Blast Furnace has increased the Company's total pig-iron output by more than one-third and is contributing many extra thousands of tons of sheet steel and tinplate a week to Britain's home and export markets.

The Steel Company of Wales Ltd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BISCUIT FLAVOURS
LINCOLN CREAM • COCONUT CREAM • TEA
MARIE • PETIT BEURRE • CUSTARD CREAM
CROMWELL • VANILLA • MADEIRA • CHOCOLATE
etc. etc.
We offer a complete range of speciality biscuit flavours which have been devised, as a result of our own research, to stand high temperature work. We shall be pleased to send on request whatever samples you may require for a test batch.
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AFFORD ALLEN & SONS LTD.
WHARF ROAD · LONDON · N.1
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- *Available from stock*
- *Totally enclosed fan cooled*
- *End windings taped to give inter-phase insulation and rigidity*
- *Six leads brought out to terminal box*
- *Outputs up to 25 h.p.*
- *Double impregnation*
- *For normal duty in any part of the world*
- *Standard dimensions to B.S. 2083 (1954)*

a lifetime of service...

G.E.C.

motors

Ask for Technical Description No. 431

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AS

a buyer of **corrugated fibreboard cases** and fitments you will rightly demand the best at a competitive price.

That's where Cooks can help you . . . an independent manufacturing company, backed by a wealth of experience and a completely up-to-date re-equipped factory . . . we offer a new personal service to industry—protection **plus** for **your** product. Bring your packaging problems to

COOKS CORRUGATED CASES LTD.

HATFIELD · HERTS

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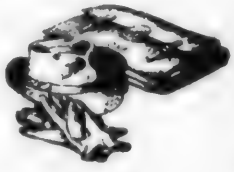
CLEAN and STERILISE

the B.H.C. way!

PLANT
EQUIPMENT
WALLS
FLOORS

Every cleaning problem in the food factory presents some different factor. Ideally one cleanser for every job would simplify matters, but this might not be a practical proposition nor economical. B.H.C. have many years experience in making the detergent fit the job. We have Analytical, Technical and Bacteriological Laboratories dealing exclusively with food trade problems.

Let us advise you — you only have to ring or drop a postcard for our Technical Representative to call.



SAVES TIME LABOUR AND MONEY

Multi+Grade Detergents and Sterilising Agents

B.H.C. LABORATORIES SPECIALISE IN GRADED DETERGENTS

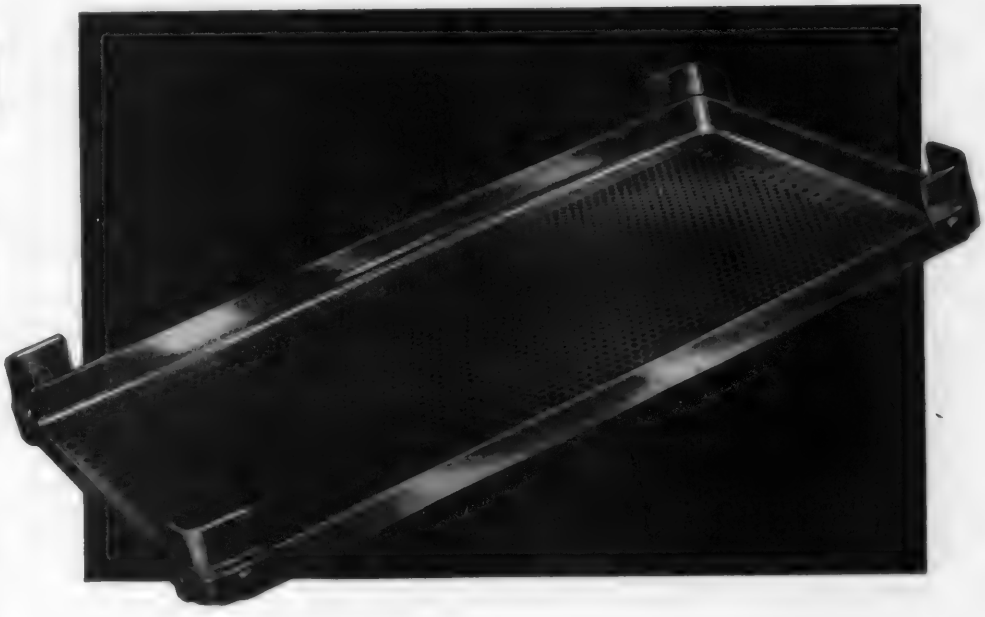
THE BRITISH HYDROLOGICAL CORPORATION

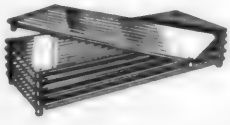
COLLOIDAL WORKS, HIGH PATH, MERTON, LONDON, S.W.19 Telephone: LIBerty: 1021 (4 lines)

Associated Companies: *Colloidal Detergents of Australia Ltd., Australia: Chemical Services (Pty.) Ltd., South Africa, Amsterdam, Brussels, Copenhagen, Dublin. Helsinki, Johannesburg, Kalbotn Norway, Lille, Lyon, Ober-Winterthur Switzerland, Paris, Sydney.*

The CHIEF ENGINEER says—

"Give them plenty of air with WARCO...





...Perforated Trays"

The illustration shows our standard tray T.27151 with perforated base and corner stacking brackets. Many of our extensive range of trays can also be supplied with perforated bases and stacking features—
details given on request.

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'WARCO'
Reg. Trade Mark
ENGLAND
First Choice for Aluminium Equipment

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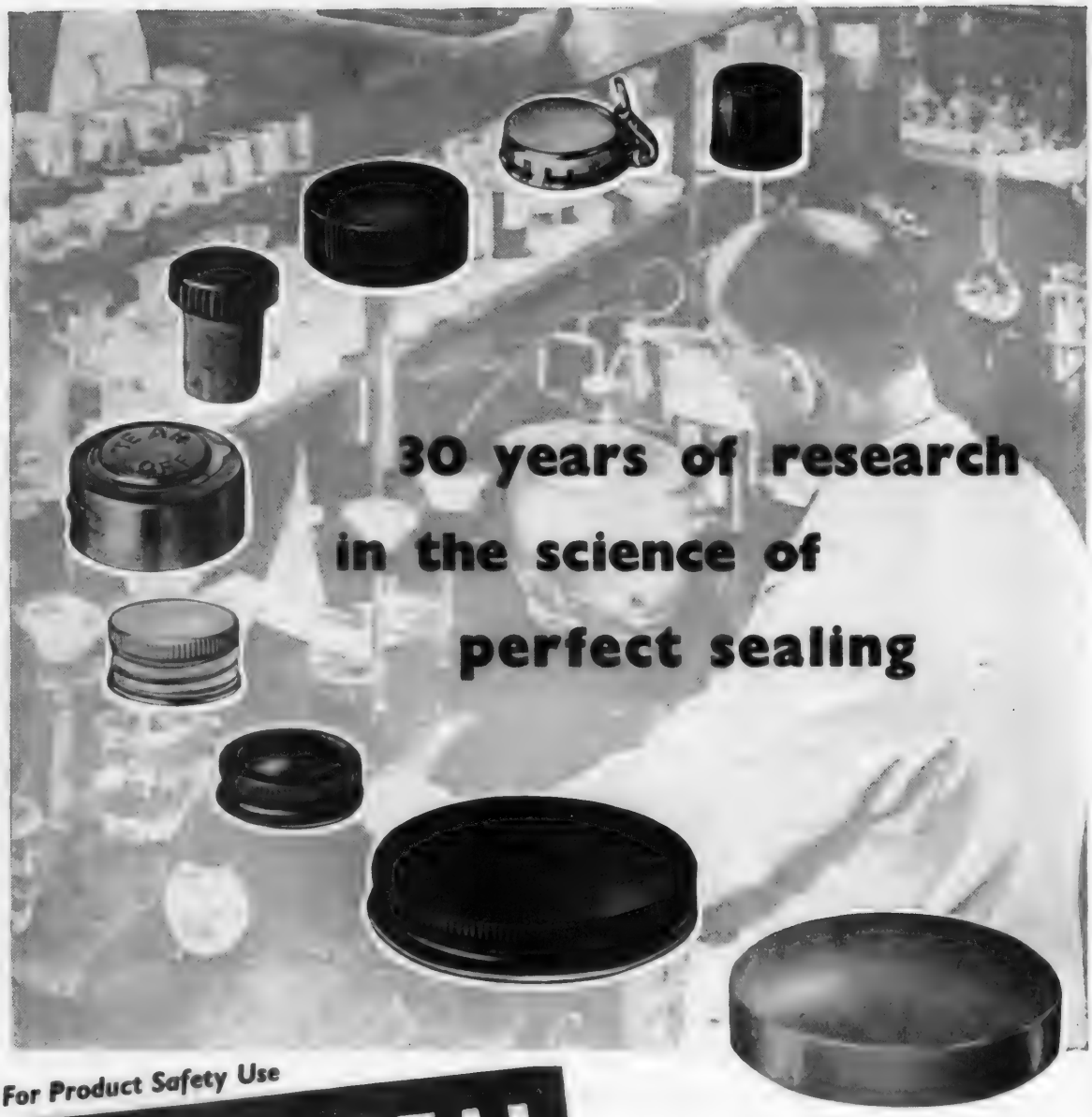
IN ASSOCIATION WITH **ALMIN LIMITED** STOKE POGES · BUCKS

BIRMINGHAM ROAD, WARWICK **TELEPHONE: WARWICK 693-696**



For Product Safety Use

KORK-N-SEAL

MOULDED & METAL CLOSURES

WITH UGB GLASS CONTAINERS

KORK-N-SEAL LTD

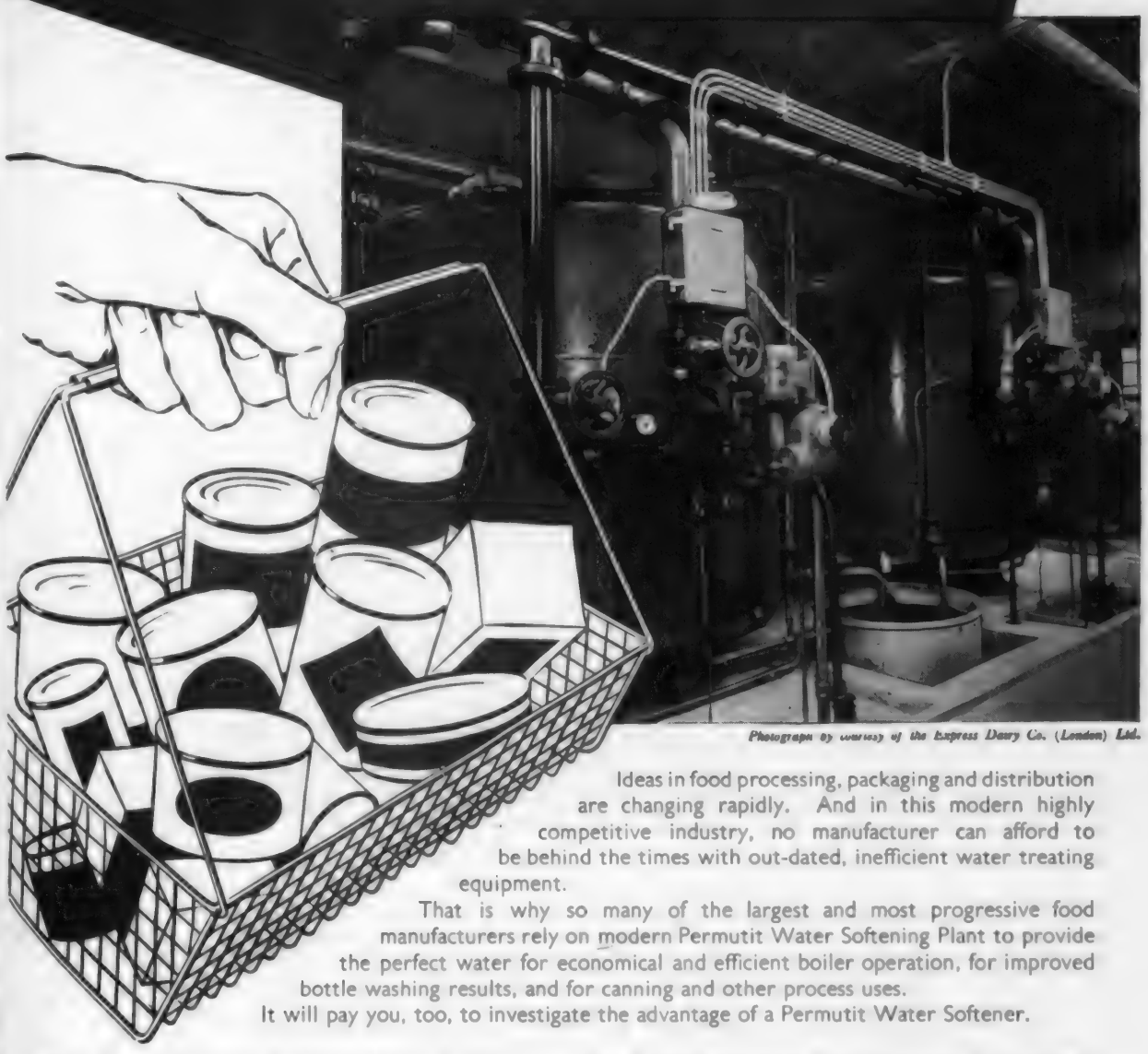
UGB CLOSURE DIVISION

The Closure Division of The United Glass Bottle Manufacturers Ltd

Head Office: 8 LEICESTER STREET, LONDON, W.C.2 Tel.: GERRARD 8611 (18 lines) Grams.: KORKANSEAL, LESQUARE, LONDON

PERMUTIT

WATER TREATING PLANT SERVES THE MODERN FOOD INDUSTRY



Photograph by courtesy of the Express Dairy Co. (London) Ltd.

Ideas in food processing, packaging and distribution are changing rapidly. And in this modern highly competitive industry, no manufacturer can afford to be behind the times with out-dated, inefficient water treating equipment.

That is why so many of the largest and most progressive food manufacturers rely on modern Permutit Water Softening Plant to provide the perfect water for economical and efficient boiler operation, for improved bottle washing results, and for canning and other process uses.

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The variations to be played on the theme of the corrugated case are endless. Look inside one today and what will you find . . . animal, vegetable or mineral? Could be any one of them, for they all travel safe and sound in corrugated cases — the day-old chick to the country market, the carnations to the West End reception, the record-changer to the radio shop in Sydney. Diverse indeed are the uses, and the users, of corrugated containers. And diversification can proceed even quicker — and on an even greater range of packaging products — now that the experience and the resources of Bowaters and Eburite are linked in . . .

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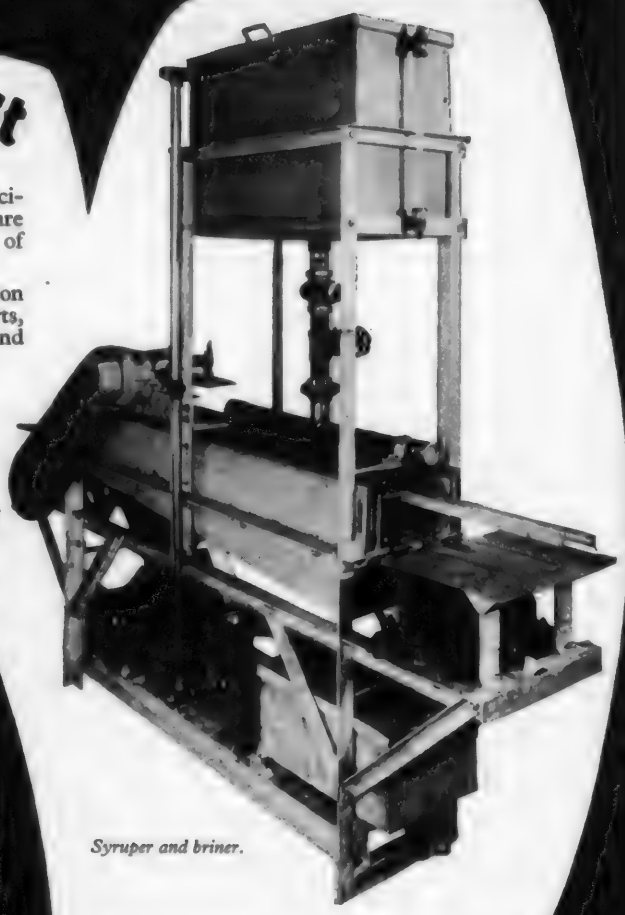
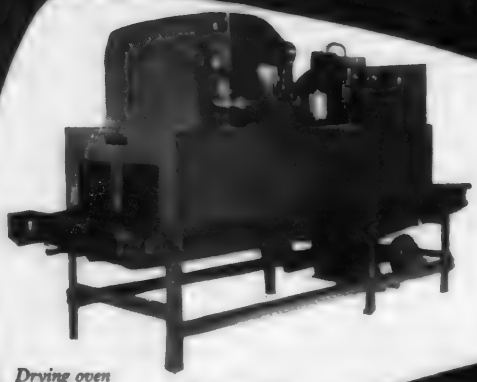
Increased production is dependent upon the efficiency of your mechanical handling equipment. We are specialists in the design and manufacture of plant of all kinds for the Food Industry.

Our products include can-handling plant, friction and bar elevators, cable conveyors, ovens, retorts, coolers, washers, blanchers, exhausters, graders and gooseneck elevators.

Consult us on your particular requirements.

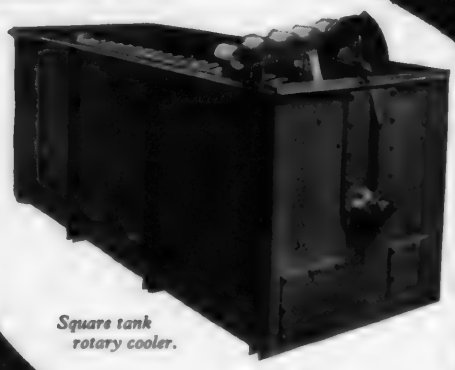


Syruper and briner.



Drying oven as supplied to Dewey & Almy Ltd.

Twelve-line exhauster with stainless steel diamond chain.



Square tank rotary cooler.

BRABY

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London Works, Thames Road, Crayford, Kent *Telephone: Bexleyheath 7777*

(Successors to the G. C. Engineering Co. Ltd., Deptford, S.E.8.)

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QUALITY in Every Form GLASS CONTAINERS

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★ Packed in easily handled cartons

Problem No. 4 **Heavy condensation through super-saturated air**

In industries such as Tanning, Cleaning, Textiles, Canning, etc. certain processes result in large quantities of steam being released into the building where the plant is housed. This may happen, either continuously, or at a set point in the processing cycle. Generally, owing to the nature of the processes the steam cannot be trapped at source with the result that the humidity of the atmosphere is raised, working conditions become unpleasant, output is reduced, and the number of accidents and mistakes tends to rise. Also the steam condenses on the structure, corroding and destroying paintwork. In winter this condition is still further intensified. This is a common problem that Colt have often met and overcome in their work for over 9,000 major industrial and commercial organisations.

Whatever your problem, be it heat, fumes, smoke, steam or condensation, Colt can cure it.

A combination of Colt SR and CO ventilators and mechanical inflow units (with heater batteries) were recommended when G. H. Norton consulted Colt prior to the reconstruction of their Dye-house. Now, despite the fact that open dye vessels are used, the internal temperature is maintained at 20° F above the outside temperature and the relative humidity at 70/80% Even more important, the new system completely clears the atmosphere within three minutes of the close of the dyeing cycle.

Send for Free Manual on Colt Ventilation to Dept. V4/12

COLT

VENTILATION

COLT VENTILATION LTD · SURBITON · SURREY

TELEPHONE: ELMBRIDGE 6511 (10 lines)

U.S.A. Subsidiary: Colt Ventilation of America Inc., Los Angeles.

Branches at: Birmingham, Bradford, Bridgend (Glam.), Bristol, Coventry, Dublin, Edinburgh, Glasgow, Liverpool, London, Manchester, Newcastle-upon-Tyne, Sheffield, and Warwick.

Agents in: Australia, Belgian Congo, Canada, Cyprus, India, Indonesia, Madagascar, Malaya, Mauritius, New Zealand, Pakistan, Portugal, North and South Rhodesia, and South Africa.

C 200

MXXT

A new type of "Cellophane" cellulose film for manufacturers whose products need:

PROLONGED SHELF-LIFE ★ EXTRA SPARKLE ★ NEATER, WRINKLE-FREE WRAPS

MXXT is an outstanding new type of transparent, moistureproof, cellulose film, developed specially to satisfy the stringent packaging requirements of certain products. It is the outcome of eight years' research and development.

CHIEF PROPERTIES

- ★ MXXT is exceptionally resistant to the passage of water vapour. It is a better moisture barrier than any film of comparable thickness at present available in the world.
- ★ The moistureproofness of MXXT is not adversely affected by creasing, printing or heat-sealing.
- ★ Under normal changes of humidity MXXT will not shrink or wrinkle.
- ★ MXXT has an added sparkle. It gives packs a special eye-appeal.
- ★ MXXT is highly resistant to fats, oils, greases and solvents and to the passage of gases and odours. As with all colourless, moistureproof kinds of "Cellophane", the coating is anchored.

USES: MXXT is particularly suitable for packaging foodstuffs which need an exceptional moisture barrier to maintain their freshness during shelf-life. It has distinct advantages as a direct wrap on certain products — such as biscuits — which may damage other films by abrasion, and also where a wrap is required that does not change dimensionally.

SUPPLIES: At present two kinds of MXXT film are available — MXXT 400 and MXXT 400/35. Supplies are limited, but we are increasing capacity to meet the growing demand.

PRICE: MXXT costs more than established types of "Cellophane". The price of rolls of both MXXT 400 and MXXT 400/35 in lots of 1 ton or over is 5/6d. per lb.

PATENTS: The manufacture of MXXT film is covered by the following British Patents:—

626536	651769	654342	655006	655732	663645	665479
674728	677926	679727	682689	692154	693496	700619
703010	714275	727414	731630	744669	744677	749276

756851 and other patent applications are pending.

In addition, patent applications by British Cellophane Limited have been approved or are pending in the following countries:

Australia Belgium Canada France W. Germany
India Mexico Sweden United States of America

"CELLOPHANE" — the first packaging film — and the greatest!

BRITISH CELLOPHANE LIMITED

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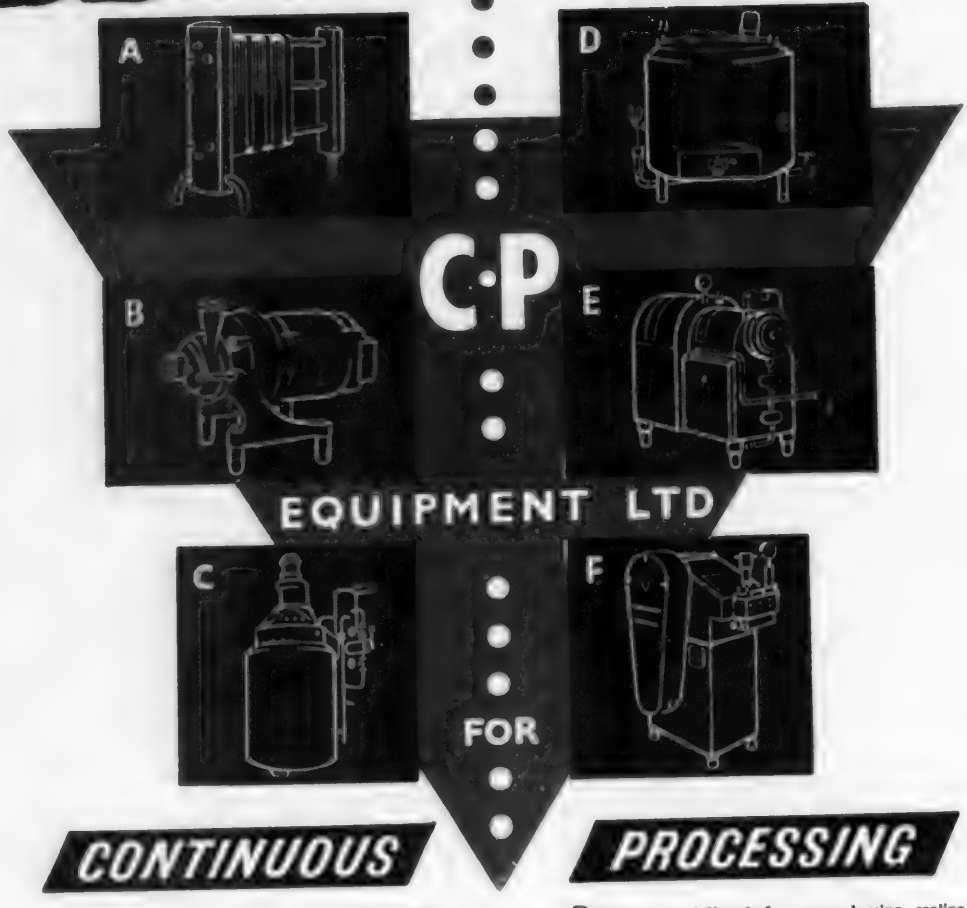
"Cellophane" is the registered trade mark of British Cellophane Limited and denotes the brand of cellulose film manufactured by them.

C.P. Lead the Way



CONTINUOUS PROCESSING

A Plate Heat Exchangers incorporating flat H.E. plates with patented synthetic seals, for cooling, heating or full pasteurising duties. Small and large capacities available.

B C.P. Centrifugal Pumps in F.M.B. stainless steel with rotary seal eliminating gland packing. Capacities up to 2,400 Imp. g.p.h. at 24 ft. head.

C Sabroe Soft-Ice machines. Capacities range from 220-1,500 lbs. soft ice per hour. Most economical for chilled water production.

D Stainless Steel Vessels for storage, heating, cooling with a wide range of agitators and emulsifiers. Special units manufactured to requirements.

E Continuous Processors for heating, cooling, blending and plasticising of viscous products. Available in three sizes.

F C.P. Homogenizers. Capacities from 100-250 Imp. g.p.h. Employing patented single service expendable valve for exceptional dispersion and low operating costs.

We supply all types of Stainless Steel equipment for numerous processing applications. Full information on application to:

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TRANSPARENT CELLULOSE WRAPPING

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TYPES & GAUGES FOR EVERY PURPOSE

The hygienic wrapping which protects food products and adds to their sales appeal. It is the logical choice for most products sold in self-service shops.

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A *NEW* MIKRO PULVERISER NOW AVAILABLE

No. 1SH Mikro-Pulveriser completely equipped, including motors, drives and switches, wired and mounted on stand legs; a complete self-contained grinding plant.

Dry or wet milling to 300 mesh B.S.S. Blending and Dispersion. Employing all the outstanding features of the smaller and larger MIKRO-PULVERISER range.

DESIGNED FOR HOURLY OUTPUT CAPACITIES 250/500-lbs. 5 h.p.

Built for precise particle control, the MIKRO-PULVERISER provides higher production at lower cost. New development has particular value in processing of heat-sensitive materials. In many cases it will effect a 25% reduction in temperature rise with a corresponding increase in production per horse-power hour. Its enhanced efficiency widens its field of application by making possible grinding of certain materials hitherto found baffling or impossible to handle.

Examples	Hourly Outputs					
FACE POWDER MIXTURE	350-lbs.	FIRST-CLASS BLEND				
SUGAR	350-lbs.	85-87% THROUGH 300 MESH B.S.S.				
KAOLIN	450-lbs.	100%	,,	,,	,,	,,
GYPSUM, RAW	1,000-lbs.	88%	,,	100	,,	,,
CHROME, YELLOW	750-lbs.	99·9%	,,	200	,,	,,
*ZINC OXIDE	350-lbs.	99·9%	,,	300	,,	,,
ICING SUGAR	350/600-lbs.	87 or 67%	,,	300	,,	,,

Please telephone or write for full specification and prices of all models to :—

Exclusive Manufacturing Licensees for PULVERISING DIVISION, METALS DISINTEGRATING COMPANY INC., SUMMIT, NEW JERSEY, U.S.A.

MIKRO-PULVERISER
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M-W.05

Presented with pride!

Seal your pack with " Viskrings " and establish confidence between you and your consumer. YOU can be confident that your bottling will reach the consumer perfect and intact. The CONSUMER will be confident that the contents are genuine and as expected—a fine product, perfectly presented. Seal all stoppered and screw-capped bottles with " Viskrings ". There is a " Viskring " to fit every bottle neck, available in a wide range of colours. " Viskrings " can be printed with your brand symbol. Send your container complete with primary closure to us for fitting. We will return it with samples and quotations for any quantity.

- " Viskrings " can be applied rapidly by hand—no machinery is necessary.
- They are self-adjusting.
- They prevent the blowing or riding of stoppers.
- They prevent the movement of screw caps once they are tightened.
- They afford protection for branded products and reduce pilferage and evaporation.
- CELLULOSE CLOSURES . . . Contain No Metal . . . Require No Adhesive.

for your Sales sake fit "Viskrings"

THE VISCOSE DEVELOPMENT CO. LTD.

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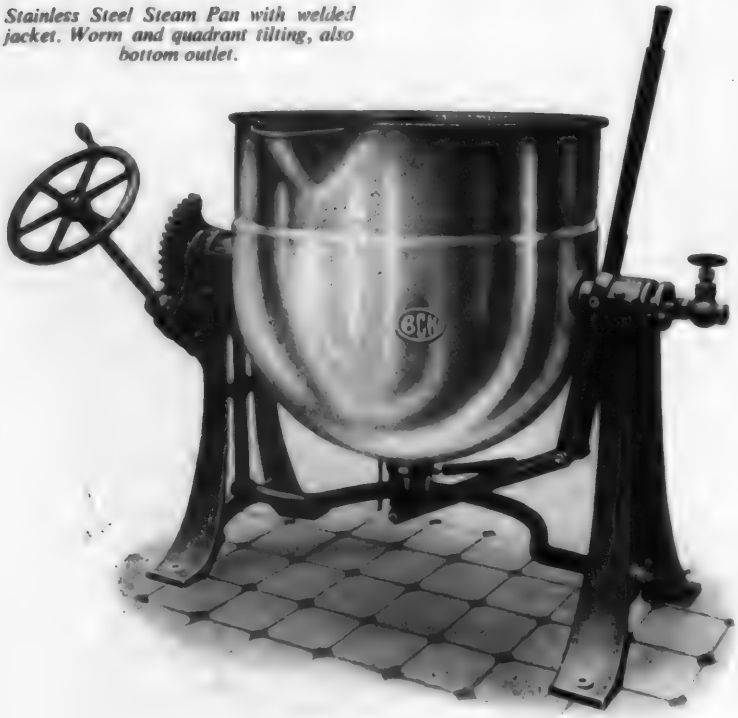
Stainless Steel Steam Pan with welded jacket. Worm and quadrant tilting, also bottom outlet.



BCH STAINLESS STEAM PANS

Battery in operation at Cadby Hall

Illustration by kind permisssion of Messrs J. Lyons & Co., Ltd.
(with acknowledgements to Messrs Food Trade Review for loan of block)

BCH

WM. BRIERLEY, COLLIER & HARTLEY, LTD.
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AND ALWAYS USE GOOD BOTTLES

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Telephone: GERRARD 8611 (18 Lines) *Telegrams:* UNGLABOMAN, LESQUARE, LONDON

A chain fed sewing table running on 56 lb. open mouth feed bags.

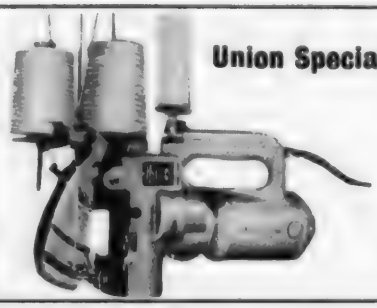
BOWATERS

Feeding Fine

Bowater sacks a strong, yet light, easi handled by wome and boys. Feeding conta is simple becau the contents a pre-weighe

Lever's Cattle Foods Limited, Bromborough, use Bowater multiwall sacks to package and protect their layers' pellets and many other poultry, pig and cattle foods.

Bowater 56 lb. multiwall paper sacks are now supplied to all the leading manufacturers of animal feeding stuffs. Proof positive that their many advantages to users are now generally recognised. Their light weight means they are easily handled by boys and women. Being pre-weighed they enable an accurate check to be kept of daily feeding. They are clean to handle, pour easily and empty every last grain of feed. They provide protection from all outside contamination, keep the food fresh and wholesome. They are water-repellent and quickly disposed of; there is no pile of empties to harbour rodents. Finally they positively identify brand and ingredients of feed. Can you wonder that farmers who have experienced benefits like these say they never want to receive their feed in any other form of package !



Union Special PORTABLE sewing head

This is just the machine for the smaller manufacturer. It is electrically powered and weighs only 9½ lb. Not only does it save time and labour but, by eliminating clumsy bunching and tying, it also enables smaller, cheaper sacks to be used and makes for easier, neater stacking.

Where's the catch?

When the catch is fish, it's frequently in strong bleached kraft Bowater bags these days. Bowaters are exclusive suppliers of these bags to Mac Fisheries. This nation-wide chain of fishmongers, particularly notable for its modern, well-designed shops, has always set the highest standards of cleanliness and hygiene. Hence these Bowater bags, strong and specially made to achieve an unusual degree of whiteness. This factor is much in keeping with the brightness and cleanliness of the shops and creates a very favourable impression with customers.

If you are interested please write for further details of these bags, or of waxed laminated bags—or any other kind of bag you may need. Bowaters can offer you a wide range of bags for pre-packaging or the counter.

PACKAGING BULLETIN

Now a *new, improved* Supakask

Feature of the new, improved Supakask steel-and-fibre drum is the new base, shown here in cross-section. This base not only gives increased protection against moisture, but also makes for easier, more stable stacking. The other main feature is that the following components are now galvanized — rim of base, rim of cylinder wall, square section closing ring.
And of course all the advantages of the old Supakask are there, the light weight, the smooth inside wall that will take a loose polythene liner without danger of rupture. Also Bowaters are able to introduce barriers of foil and bitumen laminate, which are wound into the drum wall. The result is that now, more than ever, the Supakask is the perfect package for expensive products and rough journeys.

STOP PRESS A 20″ diameter drum will soon be available to join the 14½″ and 16″ Supakasks.

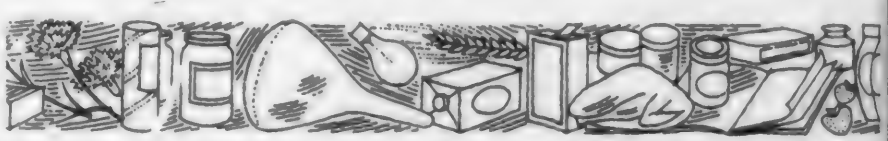
Piece of cake

An important piece too, the icing. To make really good icing the icing sugar has got to be in perfect condition. Thanks to the lasting protection it gets from the Bowater waxed wrapper, it is. Commodities like this, highly sensitive to damp and other contamination, are ideally suited by waxed wrappers. These wrappers not only give fine protection, but their colourful, eye-catching printing provides a vital influence on sales in these days of the self-service store.

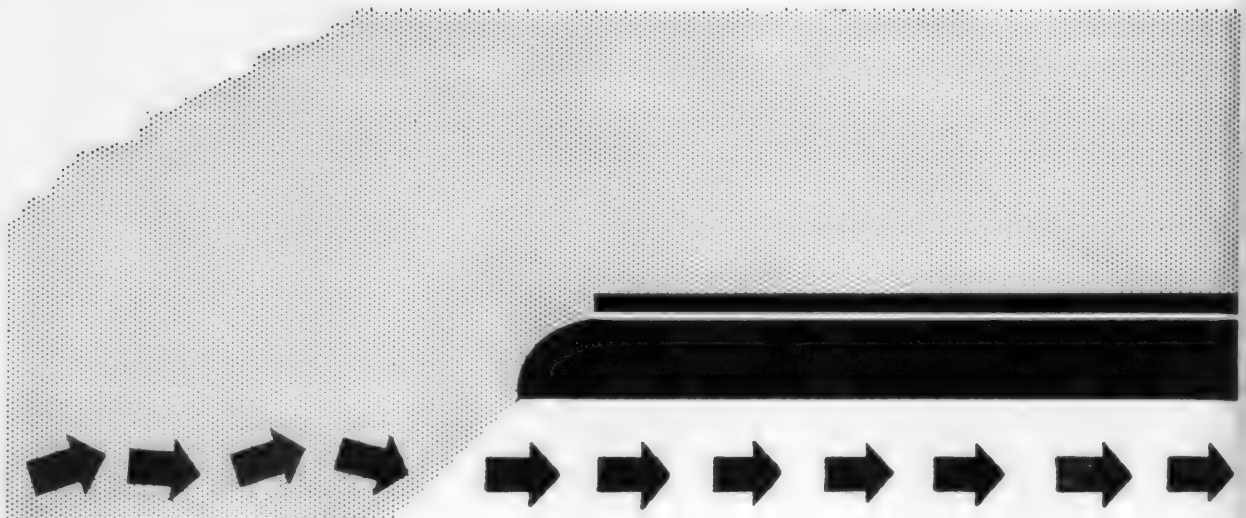
BOWATER-EBURITE JOIN FORCES

The alliance of the corrugated-case interests of Bowaters with the Eburite Group of Companies is good news for users of corrugated cases. The great experience and manufacturing resources of the two organisations are now one. Rationalisation of distribution and continuous large-scale production will lead to economies in manufacture and marketing, and a wider, shared knowledge will be brought to bear on individual packaging problems. Corrugated cases made by the two organisations carry an ever-increasing variety of products — from beer to biscuits, TV tubes to turkeys. Other products of the new company range from chocolate boxes to laminated baking cases.

The name of the new company is Bowater-Eburite Limited



Inquiries on any aspect of Bowater packaging will be welcomed by
DIVISIONAL SALES MANAGER, PACKAGING DIVISION,
BOWATER HOUSE, STRATTON STREET, LONDON W.1 MAY 8060



Better Lighting—
Better Production

What is the lighting in your factory like? Have you recently checked the lighting level round the works with a light meter?

The *right* lighting has a significant effect on the speed and accuracy of production. When its strength, position and type is suitable for each job the craftsman can give full play to his skill, and the works engineer can do full justice to his shop.

Good lighting is only one of the many ways in which electricity is playing a vital part in the drive for higher productivity.

Electricity for Productivity

Ask your ELECTRICITY BOARD for advice and information, or get in touch with E.D.A. They can lend you, without charge, films about the uses of electricity in industry. E.D.A. are also publishing a series of books on Electricity and Productivity. Titles now available are: Electric Motors and Controls, Higher Production, Lighting in Industry, Materials Handling, and Resistance Heating. Price 8/6, or 9/- post free.

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British Electrical Development Association
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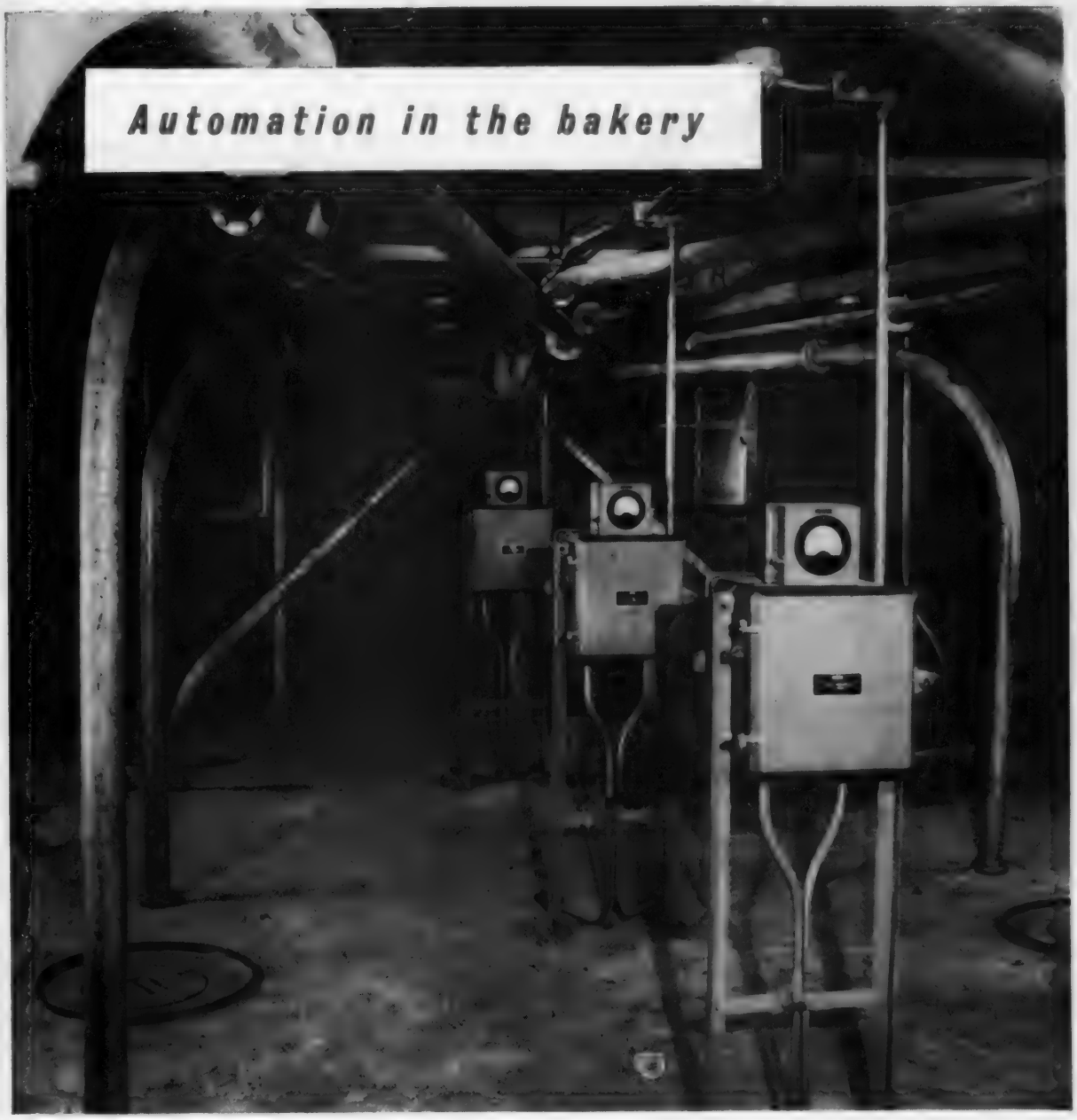


Instead of counting sacks

The modern baker does not count sacks when he wishes to know how much flour he has in storage. He looks at his Simon control panels: dials show him the quantity of flour available.

Where there is Simon Bulk Flour Handling and Storage there is also continuous level indication of the contents of storage bins. Dials are fitted over the bins and also on a panel in the bakery control room.

Simon Bulk Flour Handling and Storage makes things easy for the baker. The new system is cheaper, cleaner and quicker. Can it benefit *your* business? Why not consult our engineers—today?

SIMON
BULK FLOUR HANDLING AND STORAGE

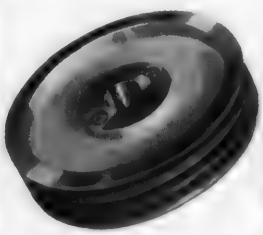
Henry Simon Limited
CHEADLE HEATH, STOCKPORT

HS 230/FS

Cut out costly fitting

USING CROFTS TAPER-FLUSHBUSHES

EASY TO FIT OR REMOVE INTERCHANGEABLE BUSHES TO FIT A RANGE OF SHAFTS



Publication DM 15. /14

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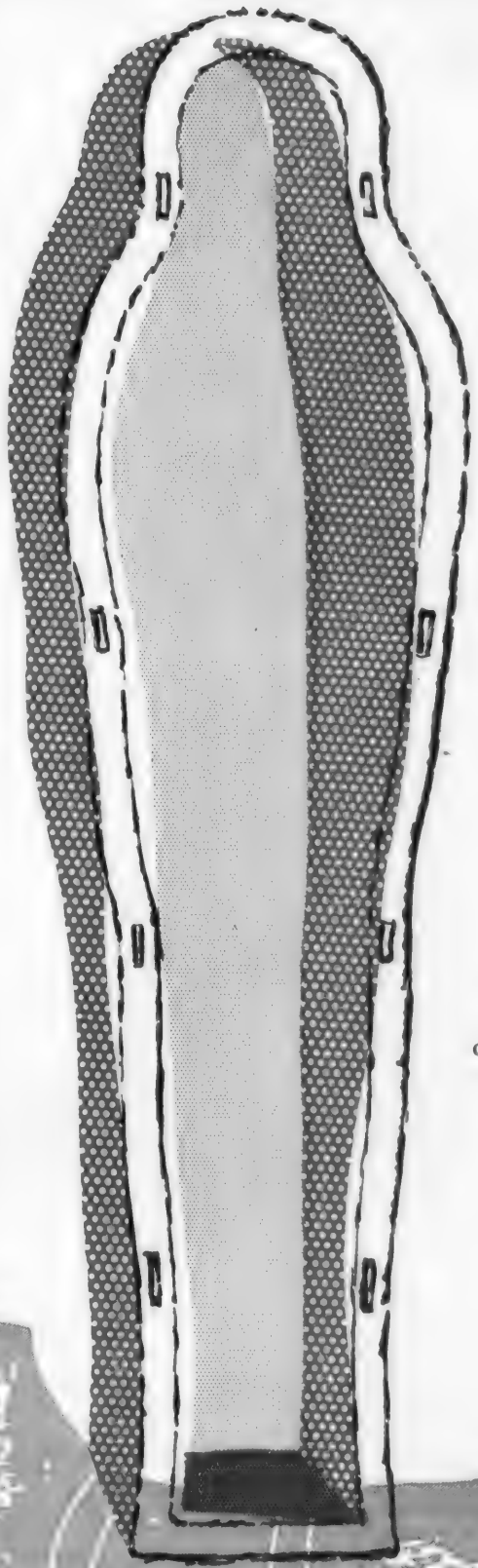
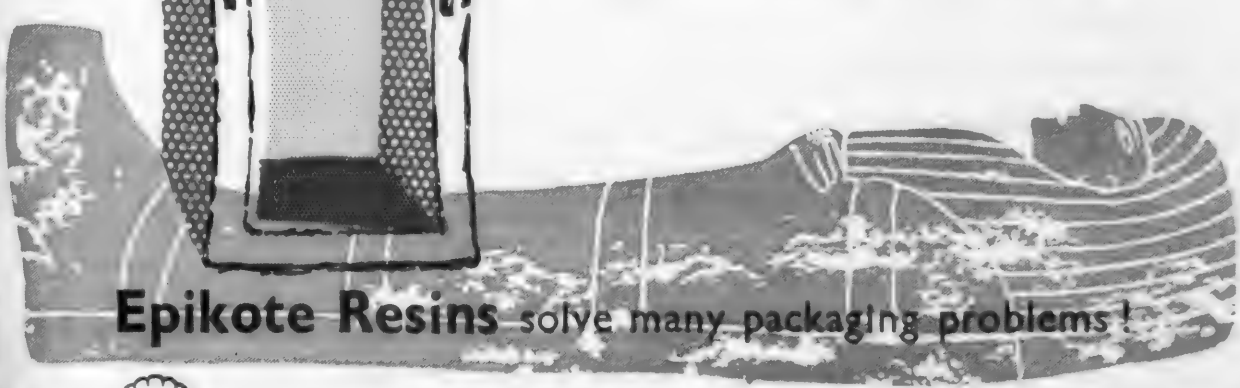


Still wrapped up in the past?

Or discovering packaging improvements with ***Epikote Resins?***

Many ancient problems of the packaging industry have now been solved by Shell's development of Epikote Resins. Decorative and protective coatings based on these new resins are unaffected by the contents of the pack and have outstanding abrasion resistance — so enhancing their shelf life and customer appeal.

Ask your packaging supplier to put you really up-to-date about Epikote Resin based coatings.



Epikote Resins solve many packaging problems!

SHELL

SHELL CHEMICAL COMPANY LIMITED, Norman House, 105/109 Strand, London, W.C.2. *Tel:* TEMple Bar 4455

E.Pa.1

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VULCANIZERS

DE-VULCANIZERS

VERTICAL AND HORIZONTAL MIXERS

REVOLVING KIERS

HARDENING CYLINDERS

HEAT EXCHANGERS

OTHER MANUFACTURES:
Edwin Danks High Velocity Economic Boilers and all other types of Shell Boilers, complete Boiler-House Installations, "Oldbury" Chain Grate Stokers, Structural Steel-work.

THE illustration shows a Steam Jacketed Mixing Pan 4' 6" diameter by 5' 0" deep, fitted with stirrer gear operated by electric motor and reduction gear. This type of mixing pan can be made in any size to satisfy special requirements and working conditions. Vessels of the same design are supplied with or without steam jacket, or, alternatively, fitted with internal steam coils.
Manufactured in mild steel, stainless steel or mild steel with integrally clad material of stainless steel or monel.

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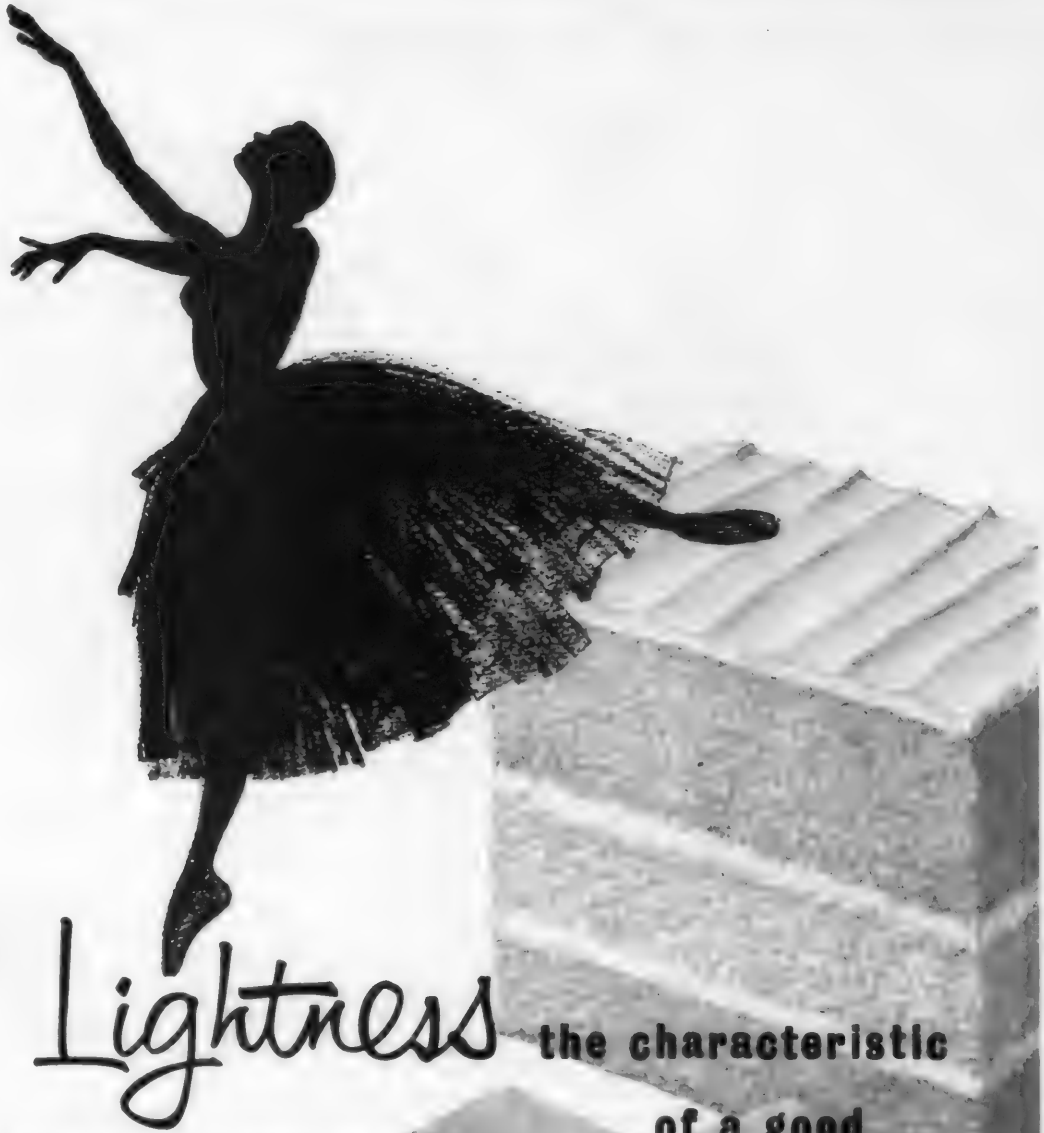

Lightness the characteristic of a good High-Sugar Cake

IMPORTANT ROLE OF FAT. The lightness which is a characteristic of all good high-sugar cakes depends on the high performance of the ingredients—the fat in particular. What other characteristics do we look for in high-sugar cakes and which fat is recommended to ensure good results? First, in the production stages the batter should be beautifully smooth and silky with the right consistency for ease of scaling and handling. Then, the baked cake should be well built; the crust should have good "bloom"; the texture should be fine and even, and the volume should be good.

High-sugar cakes made with the CBC special quality fat, Hyvo, have all these desirable characteristics. They have a rich background flavour, retain their moistness and have a good shelf life.

When high sugar cakes were reintroduced after fat rationing ended they opened up a new field. After years of austerity the housewife was ready to sample luxury fare and the high-sugar cakes were very welcome. Because their popularity is steadily increasing, high-sugar cakes are becoming a part of normal cake production.

CONSULT CBC. CBC make and supply fats for all purposes. Their experience goes back a long way, and their specialist knowledge is at your disposal. If you have a fat problem, don't hesitate to contact our Sales Director. Phone CITy 6783 or write him at the address below.

Get your Fats and your Facts from CBC

Whatever you produce
a CBC quality fat exists to meet your need.

CRAIGMILLAR & BRITISH CREAMERIES LIMITED, SUSSEX HOUSE, QUEEN STREET, LONDON, E.C.4. Telephone: CITy 6783

The well dressed food product

IS ALWAYS IN DEMAND

Collapsible metal tubes combine eye-appeal . . . utility . . . and novelty. They offer a tremendous sales impetus to whatever food product is first in its field with this new idea in food packaging. *That product could be yours.* Why not talk to H. G. Sanders about it?

Tubes for food packaging offer a variety of advantages—to the housewife and to you. They are handy and economical, providing an applicator as well as a pack. Contents last indefinitely, protected against drying out and contamination. Tubes are light yet strong, giving maximum contents for minimum bulk. Their initial cost, including cap, liner and printed-on label, is moderate; and quick automatic filling and closing, and reduced breakages and freightage charges all help keep down production costs.

Above all, TUBES SELL MORE.

WE ARE EXHIBITING AT THE
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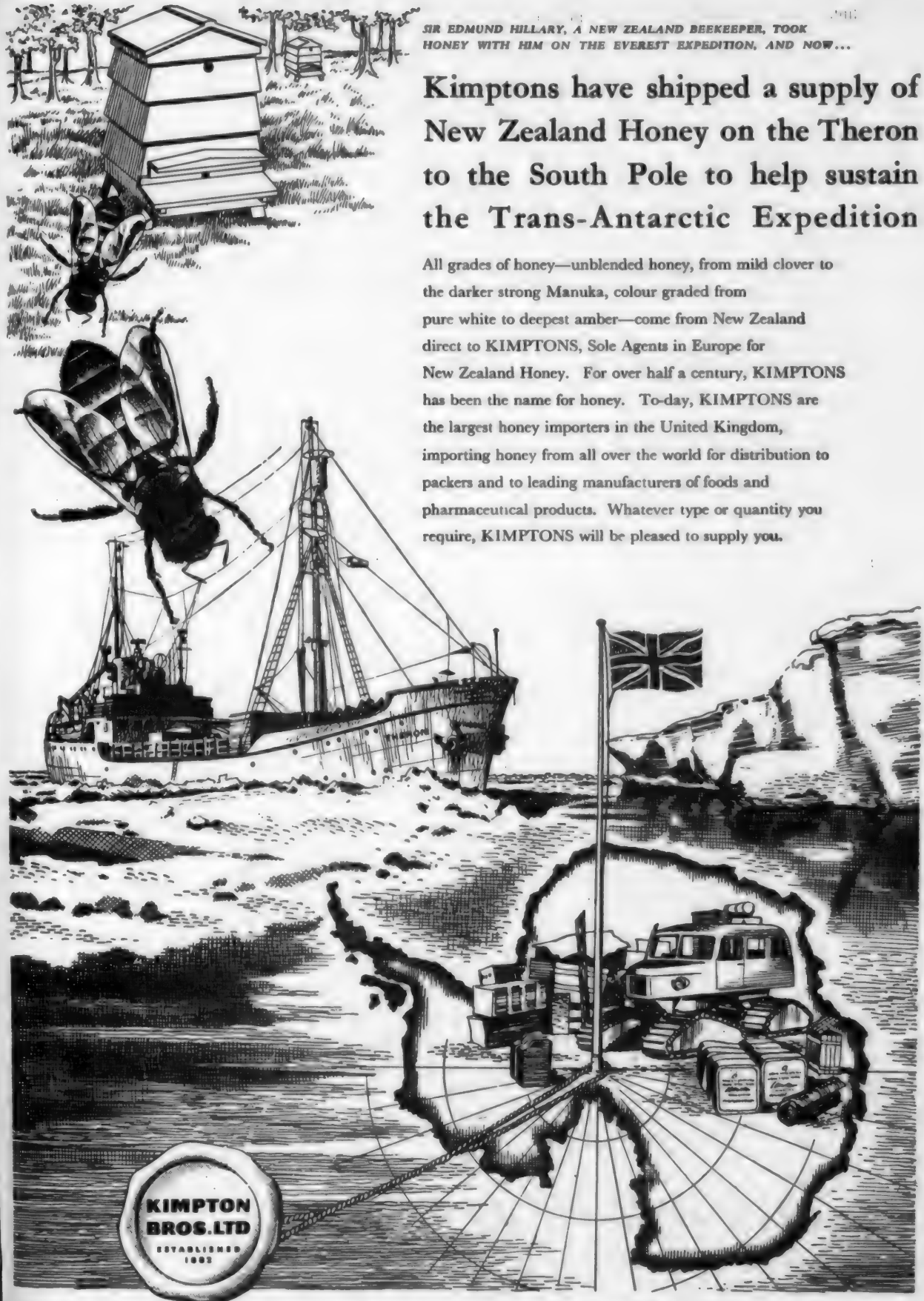
FOOD PACKAGING IN TUBES

Technical advice and co-operation on any tube-packaging project freely available. Please write or telephone :

H. G. SANDERS & SON LTD., Gordon Road, Southall, Middlesex. Tel: Southall 5611



SIR EDMUND HILLARY, A NEW ZEALAND BEEKEEPER, TOOK HONEY WITH HIM ON THE EVEREST EXPEDITION, AND NOW...

Kimptons have shipped a supply of New Zealand Honey on the Theron to the South Pole to help sustain the Trans-Antarctic Expedition

All grades of honey—unblended honey, from mild clover to the darker strong Manuka, colour graded from pure white to deepest amber—come from New Zealand direct to KIMPTONS, Sole Agents in Europe for New Zealand Honey. For over half a century, KIMPTONS has been the name for honey. To-day, KIMPTONS are the largest honey importers in the United Kingdom, importing honey from all over the world for distribution to packers and to leading manufacturers of foods and pharmaceutical products. Whatever type or quantity you require, KIMPTONS will be pleased to supply you.

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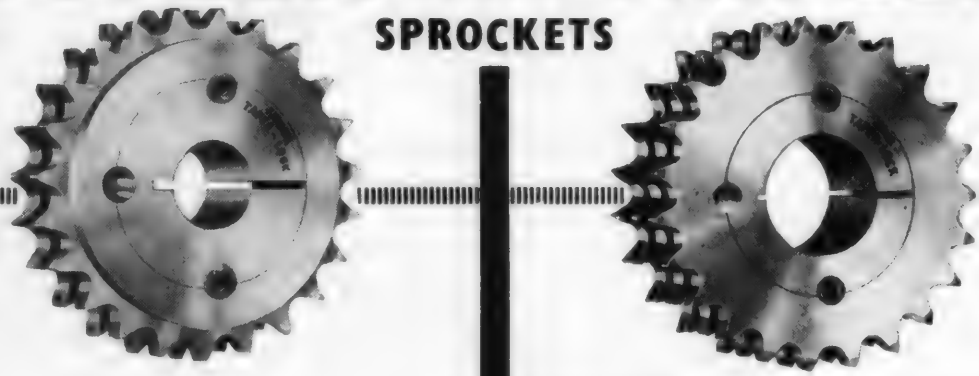
Associate Members of the British Food Manufacturing Industries Research Association

Fenner Taper-Lock bushes the fastest and simplest means of fixing to shafts, have now been extended to chain drives with

DUPLEX and TRIPLEX

SPROCKETS



THERE ARE OVER 500,000 TAPER-LOCK BUSHES IN USE WITHOUT A SINGLE FAILURE

TAPER-LOCK BUSHES GIVE YOU

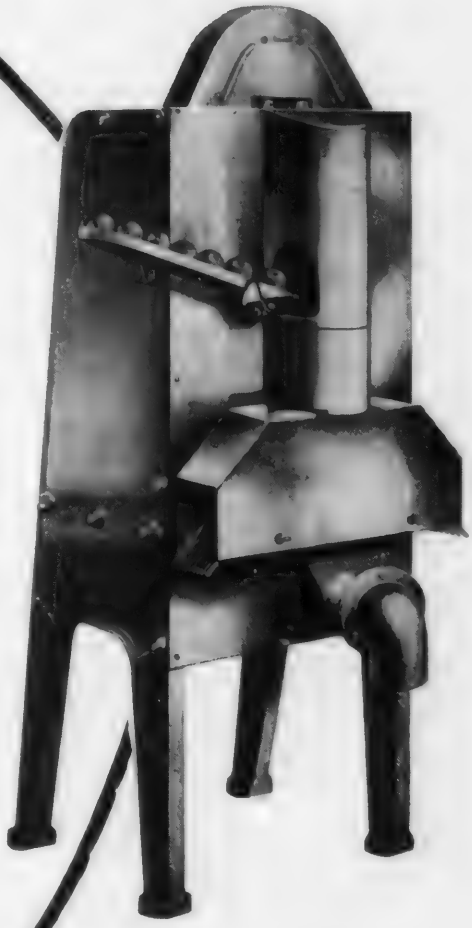
- *EASY "ON-IN-A-MINUTE" FIXING*
- *REMOVAL BY ONE TWIST OF THE WRIST*
- *NO DELAYS DUE TO RE-BORING*
- *FURTHER USE AFTER SPROCKET IS WORN*
- *OFF-THE-SHELF DELIVERY FROM 18 BRANCHES*

J. H. FENNER & CO. LTD. HULL

NEW BRANCHES NOW IN LEEDS & BRADFORD

LARGEST MAKERS OF V-BELT DRIVES IN THE COMMONWEALTH

THE WHITE AUTOMATIC QUARTERING, PEELING & PULPING, MACHINE, TYPE D.C.



For oranges, lemons and similar fruit up to 3¾" diameter.

THIS IS THE MACHINE that is used by the principal preserve manufacturers throughout the country. It is a machine that has stood the test of time and their are some still operating today after 25 years service. The latest model has a patented Feeding Device, consisting of an inclined chute and tilting bucket. The bucket automatically delivers one fruit at a time into a knife box where the fruit is cut into quarters. The pulp and pith is then separated from the outer skin, the former passing into a mincer and the latter into a suitable receptacle ready for shredding.

The new feeding device makes it possible for one operator to control two machines simultaneously.

OTHER FEATURES:

- **Skin peeled to any reasonable thickness**
- **Output 60 per minute.**
- **All parts in contact with fruit are manufactured from stainless steel.**

Full details will be sent on request.
A few machines are still available for early delivery.

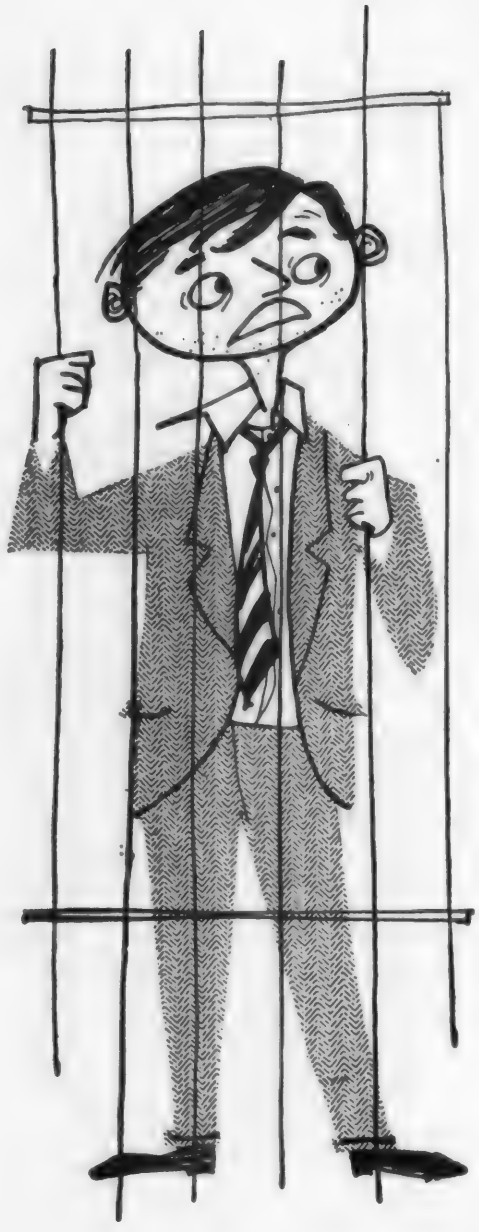
Among the well known firms who use our machines are included:

Fowler Brothers,
James Robertson & Sons, P.M. Ltd.
L. Rose & Co. Ltd.
St. Martin Preserving Co. Ltd.
R. & W. Scott (Ireland) Ltd.
T. G. Tickler Ltd.

THOMAS WHITE & SONS LIMITED White **LAIGHPARK, PAISLEY, SCOTLAND**

Telephone: Paisley 3137 (4 lines)

LONDON OFFICE: CLIFTON HOUSE EUSTON ROAD · N.W.1. Telephone: Euston 4196/7



All right— I'll come clean!

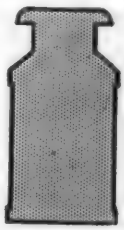
It was all my fault. I thought it was enough to have good technicians, and an up-to-date plant. But I should have known that I couldn't get all the repeat sales I want—until I'd switched to Golden Glow, the milk ingredient that gives that irresistibly *fresh* flavour.

Be advised—change to

MEGO GOLDEN GLOW

English Made Dairy Products

FULL CREAM MILK POWDERS *Spray and Roller process*	*56-lb. polythene-lined cartons* *56-lb. Kraft paper bags waxed and polythene lined* *28-lb. lever lid tins*
SEPARATED MILK POWDER *Spray and Roller process* (In short supply; but contact us and we'll try to help.)	*28-lb. tins, lever lid tins* *28-lb. and 56-lb. Kraft paper bags waxed and polythene coated Kraft liners*
EVAPORATED MILK *Unsweetened full cream*	*7-lb cans in fibrelite container*



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3,000 gallon stainless steel storage vessel.

Sheet Metal Fabrication of all kinds

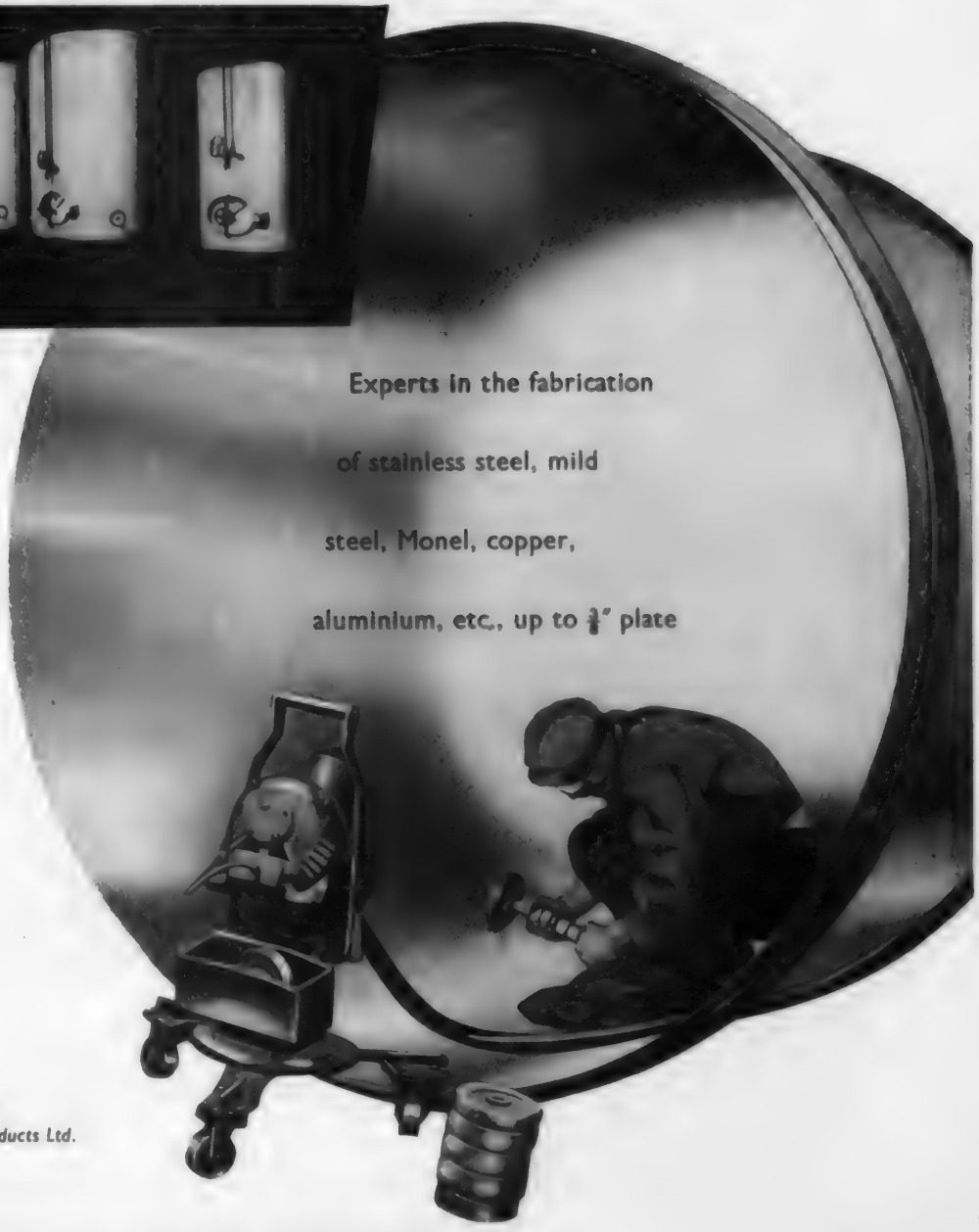
Range of four Guinness storage vessels.

Experts in the fabrication

of stainless steel, mild

steel, Monel, copper,

aluminium, etc., up to ⅜" plate



Stainless steel vessel under construction at the Brentford Works of Metaducts Ltd.

METADUCTS LIMITED

CATHERINE WHEEL ROAD BRENTFORD TELEPHONE EALing 3678

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FILTERS

Over thirty years of service to

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EIMCO engineers are always available to advise on filtration problems and conduct site tests on laboratory or pilot plant scale. EIMCO equipment is individually designed to suit YOUR requirements.

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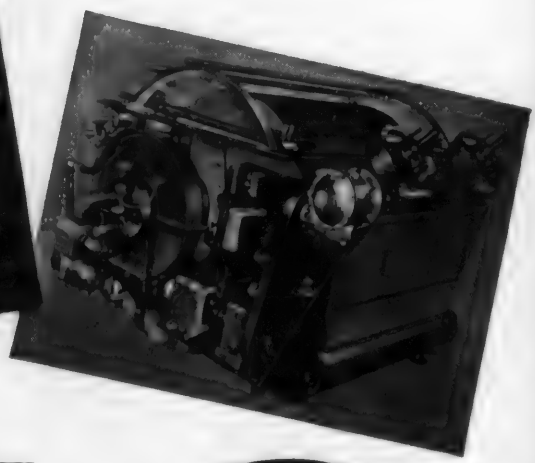

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London Office PRINCES HOUSE PICCADILLY W.1 GROsvenor 2184

pHact or fiction?

"We've got a very similar problem," we told the Old Woman, "there are so *many* applications for pH that we don't know how to start telling people about them."

For Industry too has problems of water supply, effluent disposal, washing, baking, and the preparation of food . . . but we can't discuss all its pH potential in one advertisement. All we can say is that the pH of process solutions governs the quality of a finished product—that the determination and correction of pH values at critical stages prevents waste—and that accurate pH determination is more usually known as Pye pH. That is not fiction!

Are you in a pHlap about pH?

Possibly not! But we *would* like you to write for our illustrated booklet entitled "A Happy Solution". It describes the Pye range of direct reading instruments and their associated electrode systems, and discusses the ways in which various industries are benefiting from the use of pH control.

SCIENTIFIC PYE INSTRUMENTS

W. G. PYE & CO. LTD., GRANTA WORKS, CAMBRIDGE

Introducing the
DODGE 7-TONNER
from the NEW 'N' SERIES

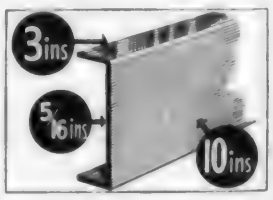
To their semi-forward control range Dodge have added 13 normal control models from 2 to 7 tons, petrol and diesel

The new 7 tonner is another example of real honest-to-goodness diesel engined truck design for which Dodge have such a high reputation. Nothing has been sacrificed to save weight, and the many important improvements associated with modern truck design help to provide operators with a vehicle that has the strength and power to withstand the most rigorous schedule.

This new 7 tonner is more comfortable to drive, too! Its all-welded, all-steel cab provides three-man roominess and has a controlled ventilation system. A spacious interior is furnished in every detail to set a new standard in comfort, convenience and safety.

CHECK THESE FEATURES

1 Choice of 3 wheelbase lengths.
2 Six-cylinder 104 b.h.p. diesel engine.
3 Three-seater, all-steel cab, six-point rubber mounted.
4 Safer, easier, vacuum assisted brakes.
5 Hydraulically operated clutch.
6 Heavy duty 5-speed gearbox.
7 High deflection "safety-ride" suspension.
8 Stronger, deeper chassis frame (10" x 3" x $\frac{5}{16}$") engineered and built to carry maximum loads with a generous margin of safety.



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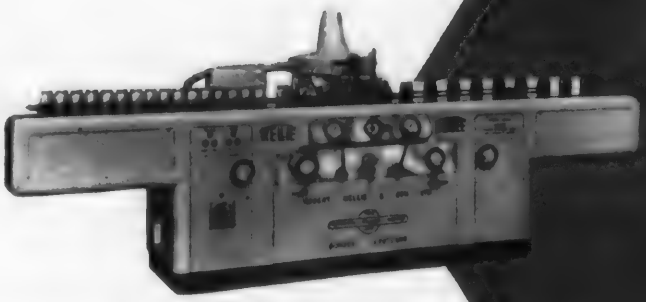
KELLIE

FOR FOOD PLANT

AUTOMATION EQUIPMENT



HIGH-SPEED AUTOMATIC STRAIGHT LINE FILLING MACHINE

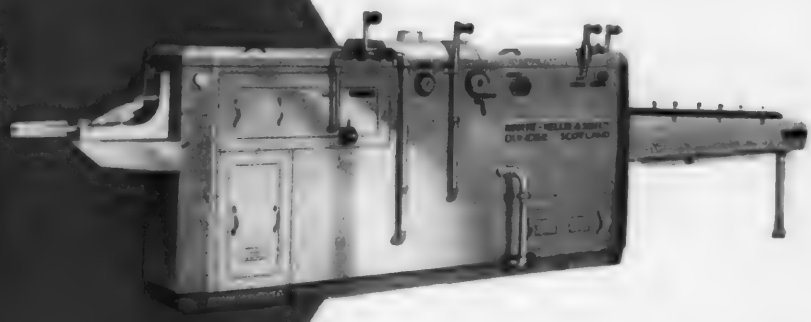
TYPE 11FP

For liquids, semi-liquid and viscous products, including jams, jellies, marmalades, soups, lemon curd, creams etc. Filling rates up to 240 1 lb. containers per minute. Smooth, accurate non-spill filling, micro-regulated.

CONTINUOUS JAR RINSING & STERILIZING MACHINE

TYPE 5JR

Will rinse and sterilise up to 120 1 lb. jars per minute. Of all welded construction it has an alternative hot-water supply and the sterilizing section is fitted with electric steam superheater. Jars delivered ready for inspection and filling.



CONTINUOUS STERILIZING, VACUUMIZING AND COOLING MACHINE

TYPE 4JN

For Washing, Sterilizing, Pasteurizing, Cooling this fully Automatic Machine has a delivery output of 120 1 lb. containers per minute. Continuous production with the minimum of operator attention. Automatic feed and delivery.

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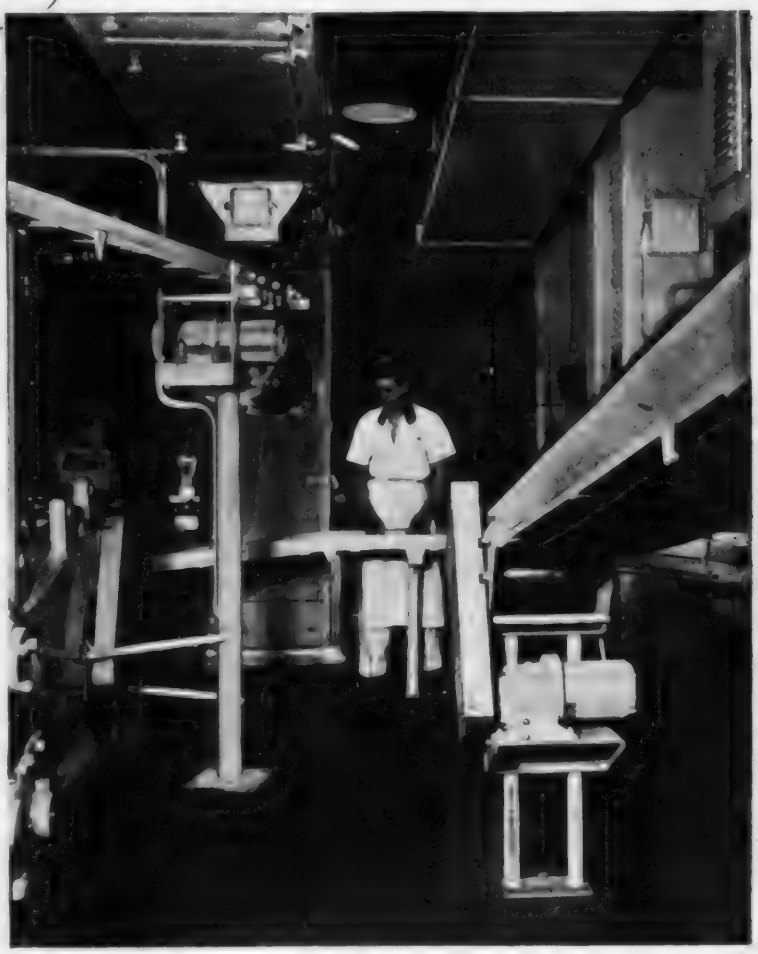
designed for every drive

in food manufacturing equipment

- Fractional horsepower motors 1/20—1 h.p.
- Drip proof, totally-enclosed, and totally-enclosed fan-cooled enclosures.
- Ball or sleeve bearings and a wide range of alternative mountings available.
- A.C. or D.C.



'ENGLISH ELECTRIC' ¾ h.p. MY5123 f.h.p. motors with 'Opperman' gears driving 'Baker Perkins' dough conveyor and return tin conveyor at Messrs. Bilsland Bros. bakery in Glasgow.

'ENGLISH ELECTRIC'

f.h.p. motors

THE ENGLISH ELECTRIC COMPANY LIMITED, QUEENS HOUSE, KINGSWAY, LONDON, W.C.2

F.H.P. Motors Department, Bradford

WORKS: STAFFORD · PRESTON · RUGBY · BRADFORD · LIVERPOOL · ACCRINGTON

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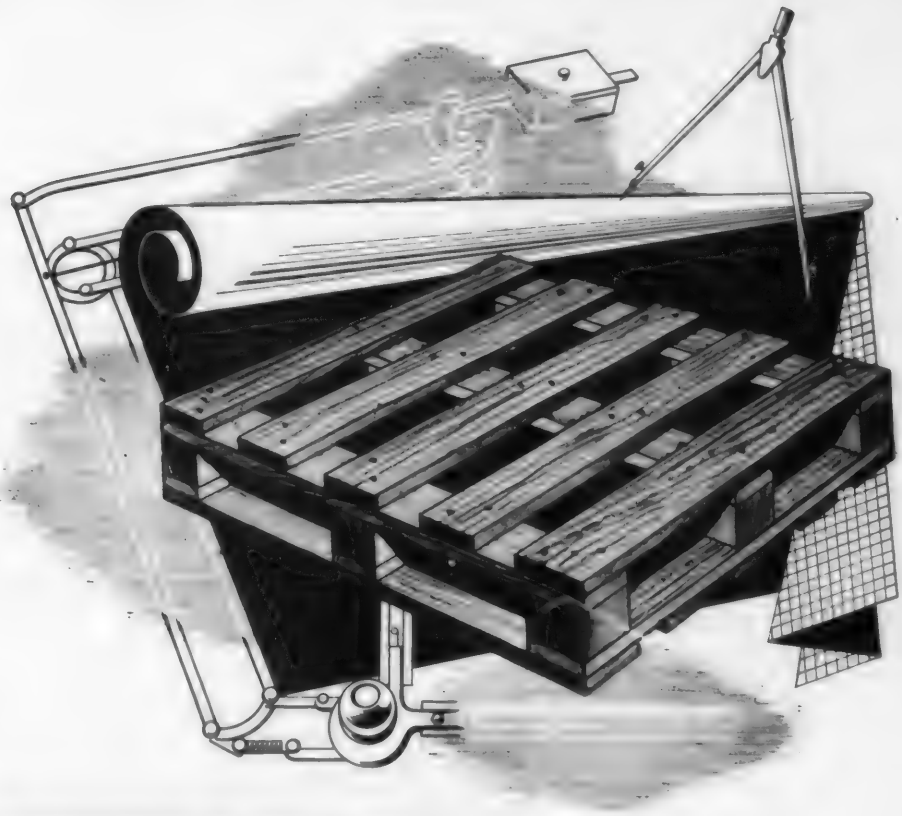

Youngman PALLETS

designed to carry food

Kiln-dried African hardwood, air-dried Swedish softwood, fresh-sawn English hardwood . . . These are three of the timbers we use regularly in the construction of pallets and stillages. Which should be used, for the greatest efficiency coupled with wise economy, in pallets which will carry prepared food in cartons? Should the pallets be slatted or not? If so, what is the correct gap between the slats?

We know all about these problems—and many others. And we know the right answers because pallets and stillages are our business. We are one of the largest manufacturers in the country, and we specialise in the manufacture of types to meet special requirements.

For the latest news of pallets and stillages, and other Materials Handling equipment see our Industrial Equipment list. You can receive it regularly by writing to Sales Dept. FM/PS.

W. C. YOUNGMAN LIMITED

MATERIALS HANDLING DIVISION

MANOR ROYAL, CRAWLEY, SUSSEX. TELEPHONE: CRAWLEY 1234 (5 LINES)

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For efficient heating and cooling

you need ROTA-PRO

CONTINUOUS PROCESSING

The Rota-Pro principle brings a small body of product into contact with a large heat transfer surface which is constantly scraped and exposed to the untreated material. Heat transfer is rapid and efficient and a uniform high quality of product is assured with substantial savings in processing time and labour. Wide capacity range.

THE CLARKE-BUILT CLOSED SYSTEM

ROTA-PRO

OF CONTINUOUS ROTARY PROCESSING

Consult CLARKE-BUILT to see if you are missing something important to your product and overhead expenses by not switching to Rota-Pro. Write or telephone:

IF YOU MAKE

jams, jellies, pastes, syrups or other viscous products, Rota-Pro offers the most efficient method yet devised for continuous rotary heating, cooling, crystallization and aeration.

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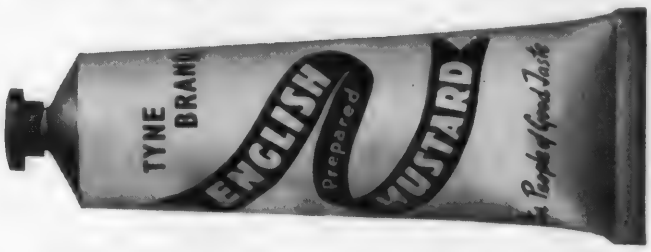
Food for thought!

FOOD IN TUBES IS
HYGIENIC, COMPACT,
EASIER TO HANDLE.



Tubes

for

food—

JOHN DALE LIMITED

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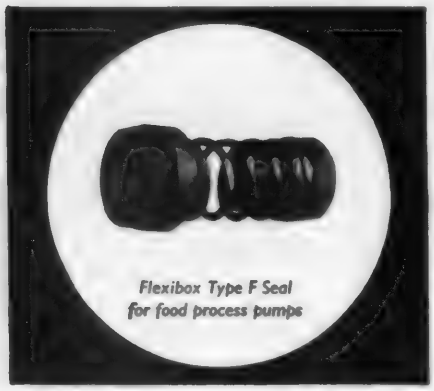
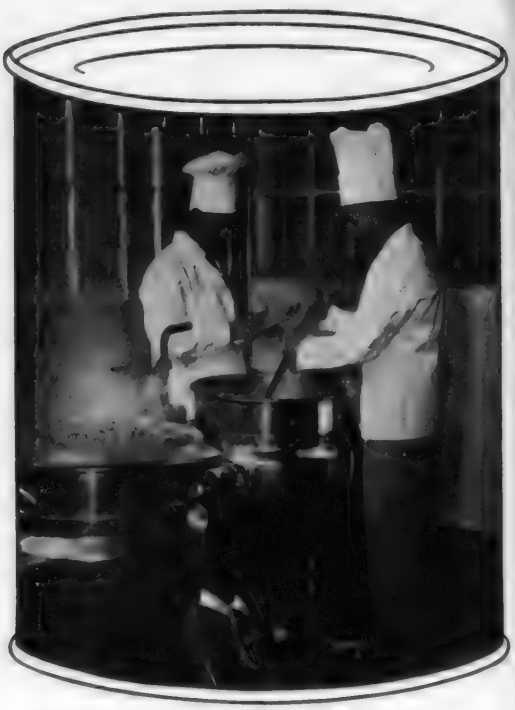
OF CANS A DAY

with complete hygiene



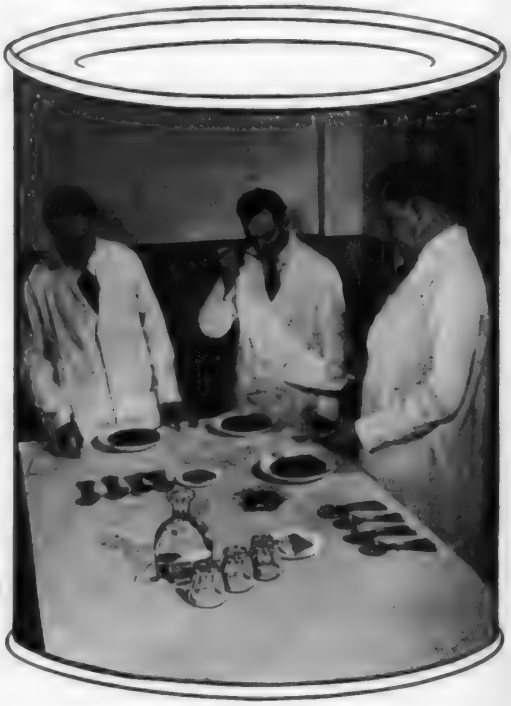
Flexibox Type F Seal for food process pumps

Patents granted or applied for in all principal countries



Above: New recipes are tested in the Heinz experimental kitchens where conditions are made to approximate those of full-scale production.

Below: Samples are taken from every batch of Heinz canned foods and tasted to ensure that perfect flavour has been achieved.



Leakage from process pumps and other rotating shaft equipment means inefficient operation and—in a food factory—bad hygiene. At the British factories of the world famous Heinz organization, which produce millions of cans of food per day, there is no room either for inefficiency or lack of hygiene. The all-important prevention of leakage is looked after by over 100 Flexibox mechanical seals. A report received from Heinz states: 'Flexibox seals have greatly cut down the loss of products through leakage. We have also found that packed gland stuffing boxes result in bad scoring, making shaft replacement necessary after a relatively short time—whereas when Flexibox seals are fitted, the shaft lasts throughout the life of the pump'.

flexibox

mechanical seals

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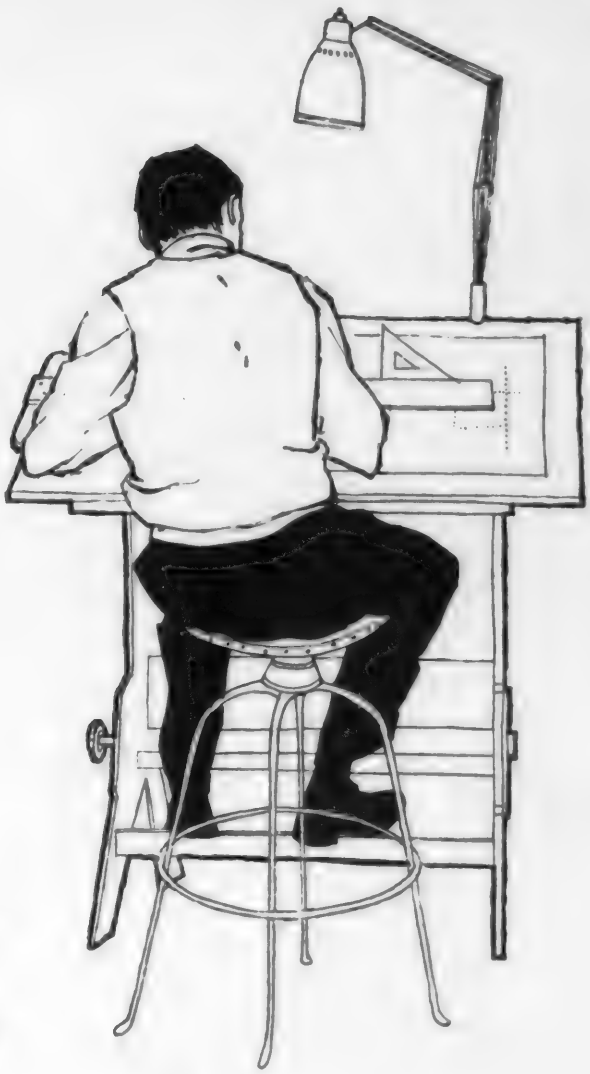

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'From start to finish'

We make Stainless Steel Plant—and we make it *to fit the job*. We will work to your specification, or prepare designs without obligation.
May we send you literature, illustrating work we have done in widely differing industrial fields—nearly all of it 'tailor-made'?

This 200 gallon Stainless Steel stationary type Steam Jacketed Pan is designed to withstand a working steam pressure of 30 lbs. per square inch. Polished inside and descaled outside, this vessel is supplied complete with motor, agitator, and hinged and flanged cover.

STAINLESS STEEL VESSELS (LONDON) LIMITED

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ABIX

ADJUSTABLE STEEL SHELVING

The illustration shows a typical installation of ABIX Steel Shelving, supplied to a well known Paint Manufacturer. Note the easy access to the Shelving and the orderly appearance.

ABIX Steel Storage Equipment is supplied in a number of Standard components which can be used to make up an infinite variety of assemblies to suit your particular need. These components can be erected and dismantled by unskilled labour in a minimum of time.

They are Steel throughout, Stove Enamelled Olive Green. All fixing bolts are sherardised.

Catalogue upon request. Our Representative will be pleased to call and submit schemes and prices if required.

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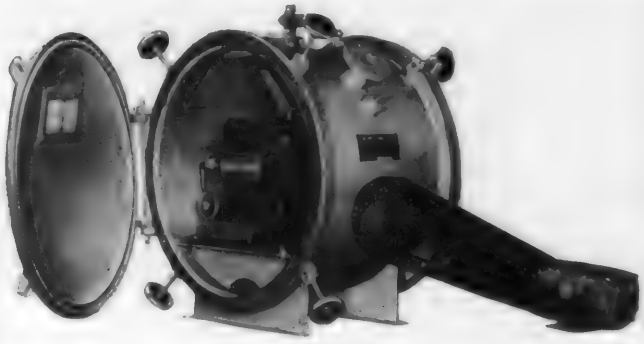

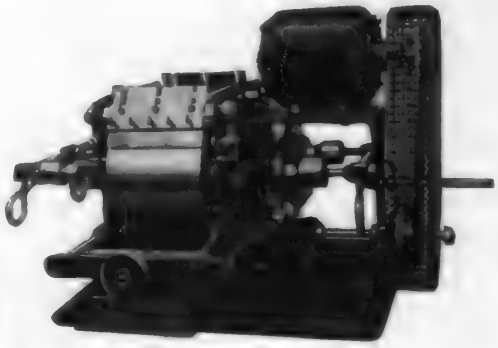

The Mitchell Small Scale Film Drum Dryer has been specially designed for the drying of pasty and colloidal materials, suspensions, liquids, etc., direct from the liquid or semi-fluid state to a final dry powder or flake.

Many firms having such a drying problem to contend with have found one of these small units of great service for carrying out tests and trials under their own control and, for the investigation of new products, in secrecy—thus enabling samples of the product to be available for market reports and sales purposes.

The Dryers are supplied with double drying drums 6′ diameter x 6½″ long, either of mild steel or stainless steel fitted with special doctor knives for cutting off the dried material. The speed of the drum revolutions can be varied within limits so that the drying time can be lengthened or shortened according to the materials being handled. The wet material is fed between the drying cylinders, which rotate and dry the product during its travel over the surface, the dried flake or powder falling into a trough underneath.

The drying can be done under atmospheric drying conditions, but in order to widen the scope of the machine for handling heat-sensitive materials or products which necessitate special drying conditions, we supply a cylindrical vacuum casing into which the Drum Dryer can be inserted and the drying carried out under vacuum. We also provide the necessary vacuumising set for Research Stations not fitted with vacuum main.

The Small Film Drum Dryer is mainly used where it is desired to produce a finished dry powder or flake without filtration, handling or labour, and is therefore recommended for products which are difficult to filter. It can also be used for handling precipitates where it is desired to eliminate filtration and handling.

These Dryers are installed in such process industries as Starch and Dextrine, Plastics, Chemicals, Fine Chemicals and Drugs, Soap, Foodstuffs, etc., etc., and can also be adapted for chilling and flaking purposes.

Enquiries also invited for Large Scale Film Drum Dryers, Flaking Machines and Chilling Rolls up to 4′ diameter x 10′ long. We invite you to write for details of our full range.

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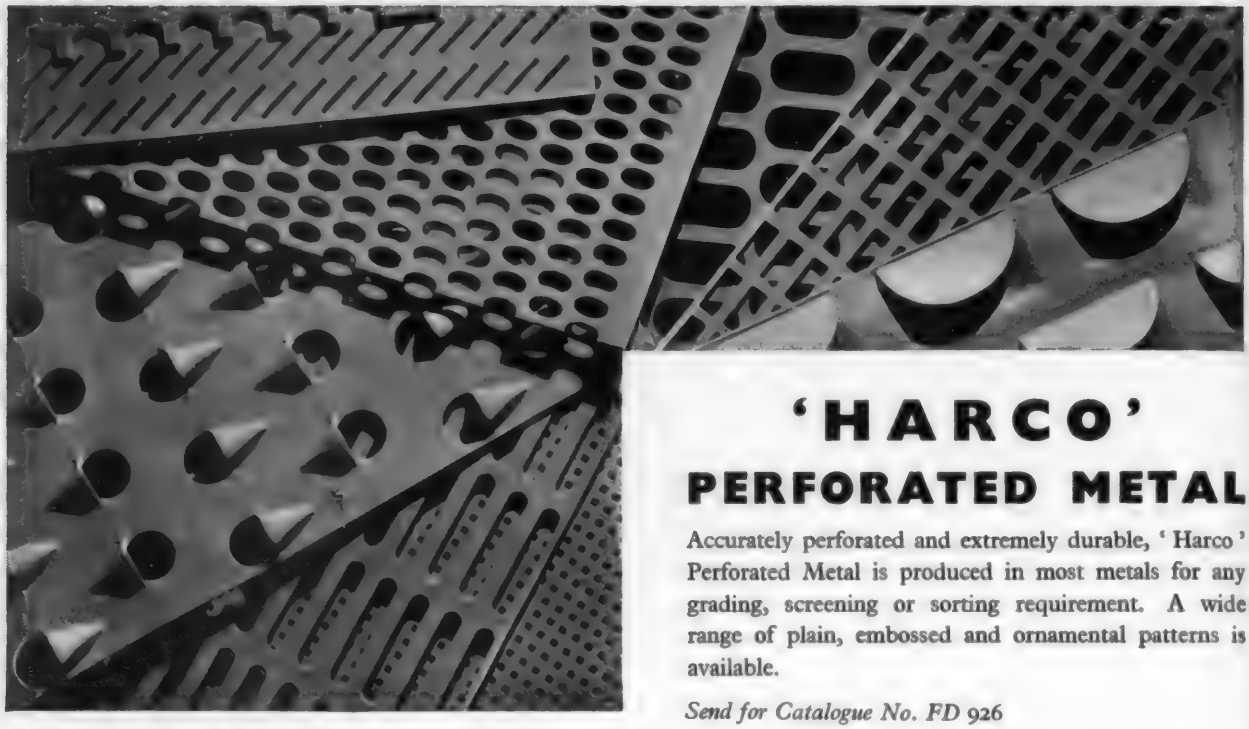

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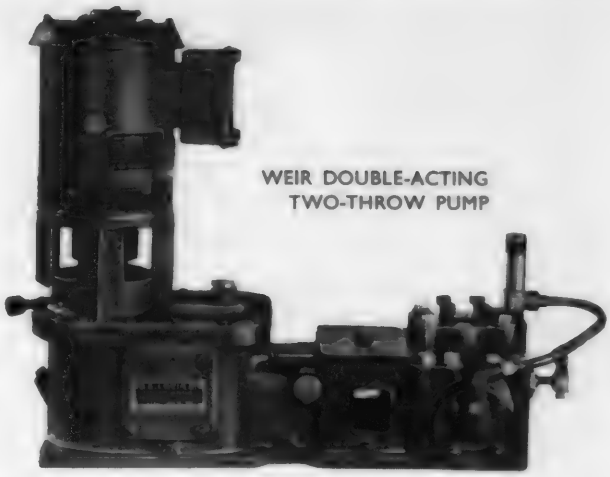

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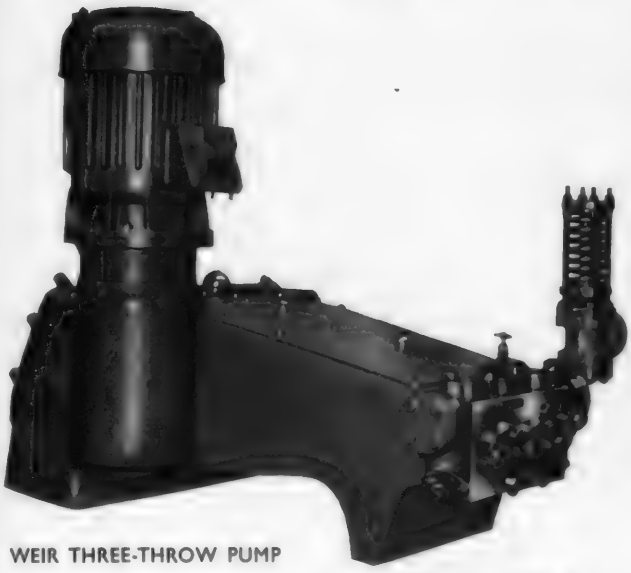

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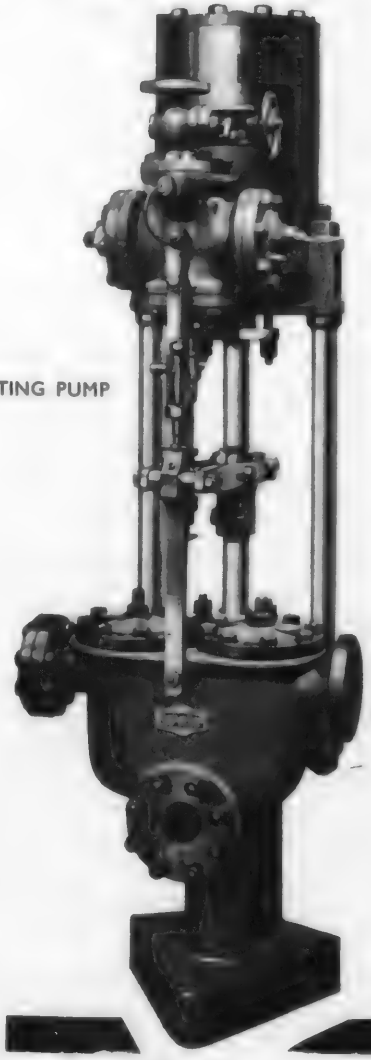

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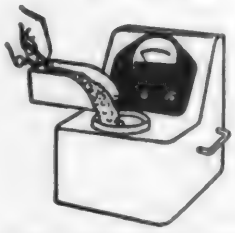

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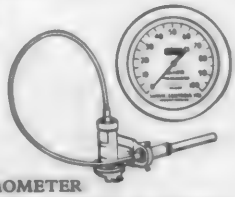

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Our Sales Director is a glutton for publicity. Hence this picture of him dressed up in armour. And the point? He just wants to attract attention, to make people talk to him. But for Pete's sake don't let him get at you! He goes on for *hours* about Stelcon Floors being literally Steel Clad—in steel plate form or with a top surface of steel chippings in concrete to make them exceptionally tough and hard-wearing. So the last thing you want to tell him is that you've got a floor full of holes into which you're always pouring money on repairs. Once you admit that, he's got you sold—sorry, cold!

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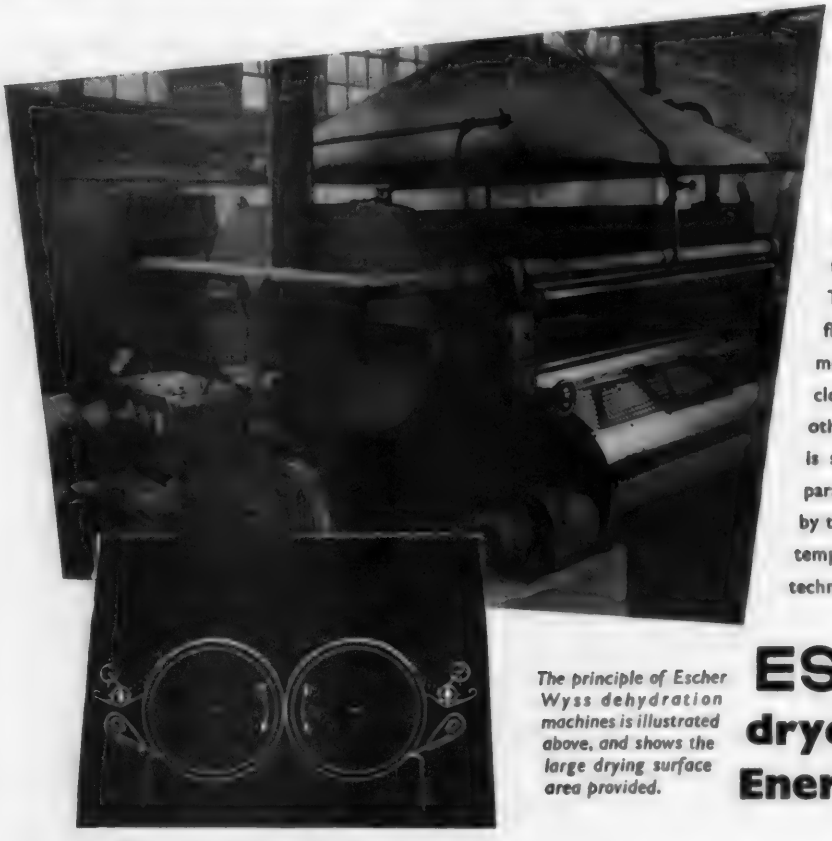

The de-hydration plant installed for Messrs. Energen Foods Co. Ltd. is typical of the Escher Wyss system—the most advanced method of moisture extraction from heat-sensitive substances. Multiple spinning discs pick up the liquid which is thrown centrifugally outwards to the edges of the discs. Two adjacent air jets project the liquid, as a fine mist, on to the drying drum. With this method there are no small pipe lines to become clogged, which is unfortunately frequent with other methods. Because this fine mist of liquid is sprayed on to heated drums, there is a comparatively large surface exposed to the heat and by this means, drying can be speeded up, at low temperatures. We will be pleased to supply full technical details of these machines.

The principle of Escher Wyss dehydration machines is illustrated above, and shows the large drying surface area provided.

ESCHER WYSS dryers at Energen Foods Co. Ltd.

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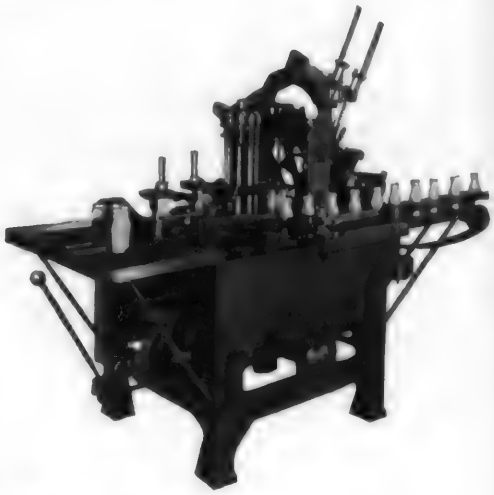

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The illustration shows body and all round neck labels being affixed simultaneously to Heinz salad cream bottles. The Purdy "Unimatic" labeller can equally well be fitted to handle round, oval, square and many other shaped containers and to do single or multi-label work, labels, with certain exceptions, being gummed over entire surface to ensure perfect adhesion. The machine, which has a variable speed drive, is fully automatic in operation. Maximum output up to 65 per minute dependent to a great extent on the work handled, estimates being given when samples of such are submitted to us.

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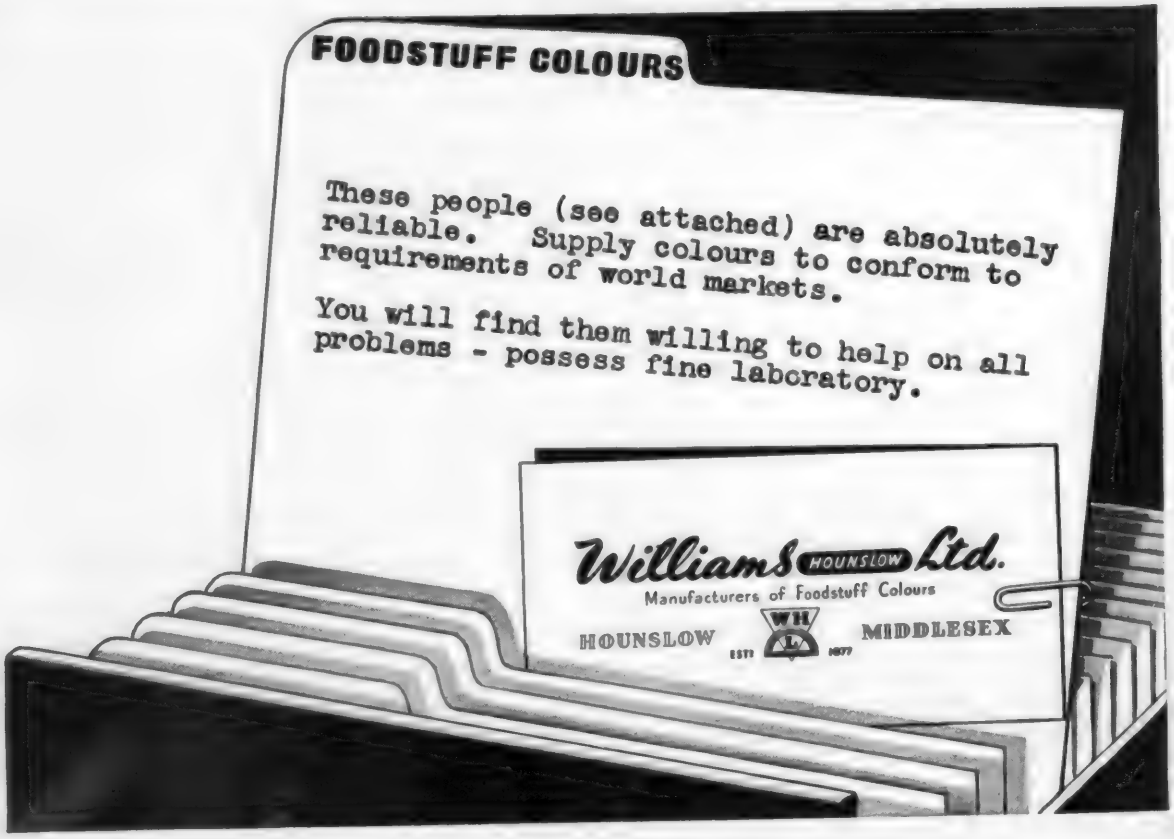
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You will find them willing to help on all problems - possess fine laboratory.
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Manufacturers of Foodstuff Colours
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The Ascot hot water system makes it easy and economical for everyone in the food and catering trades to comply completely with the new, stringent Food Hygiene Regulations specifying a controlled hot water supply. An Ascot gas water heater gives you an instant, endless flow of really hot water at low cost—hot water that's on tap from the moment you open your premises right up to when you shut up shop. Ascots are easily and cheaply installed, and the wide range available includes models to meet every need of every food trader.

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ASCOT

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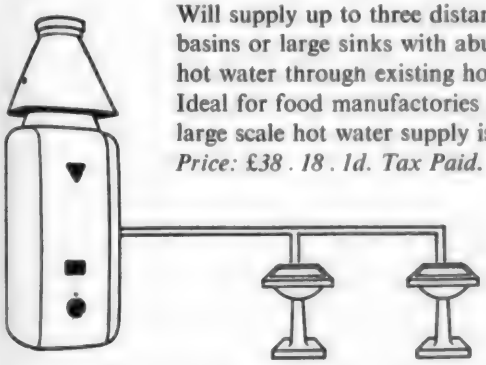

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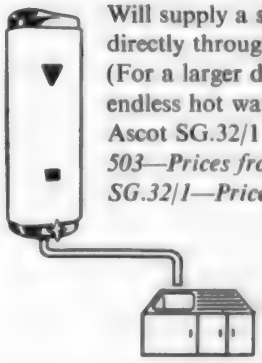

Will supply a sink or handbasin directly through a swivel spout. (For a larger direct supply of instant endless hot water to a big sink, the Ascot SG.32/1 is ideal.)
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SG.32/1—Price: £33 . 15 . 4d. Tax Paid.

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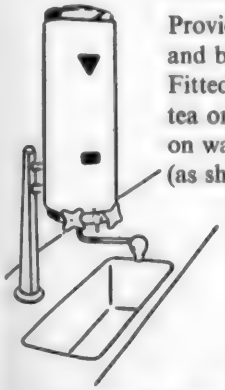

Provides warm or hot water instantly and boiling water in less than a minute. Fitted with 3-heat control. Ideal for tea or coffee making. Can be installed on walls, or on shop or bar counters (as shown) on an Ascot pillar support.
Price: £25 . 6 . 6d. Tax Paid.

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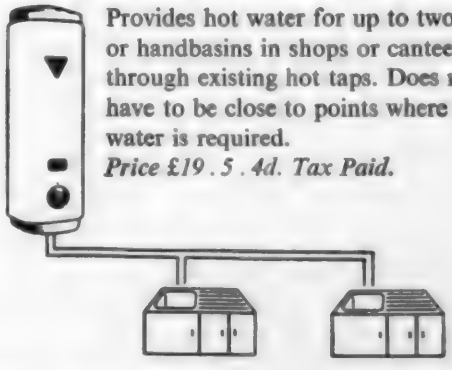

Provides hot water for up to two sinks or handbasins in shops or canteens through existing hot taps. Does not have to be close to points where water is required.
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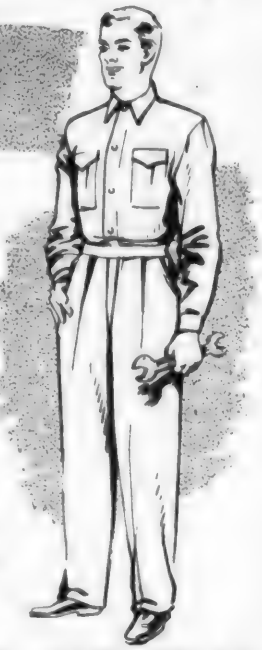

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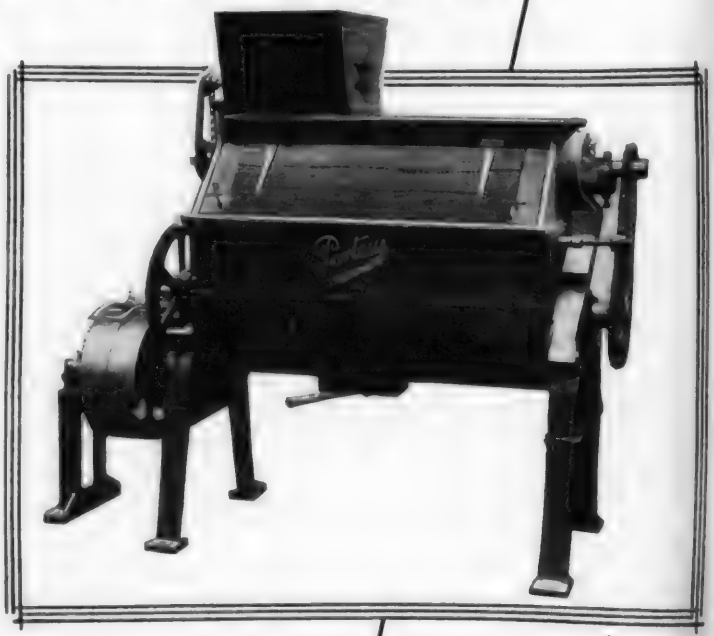

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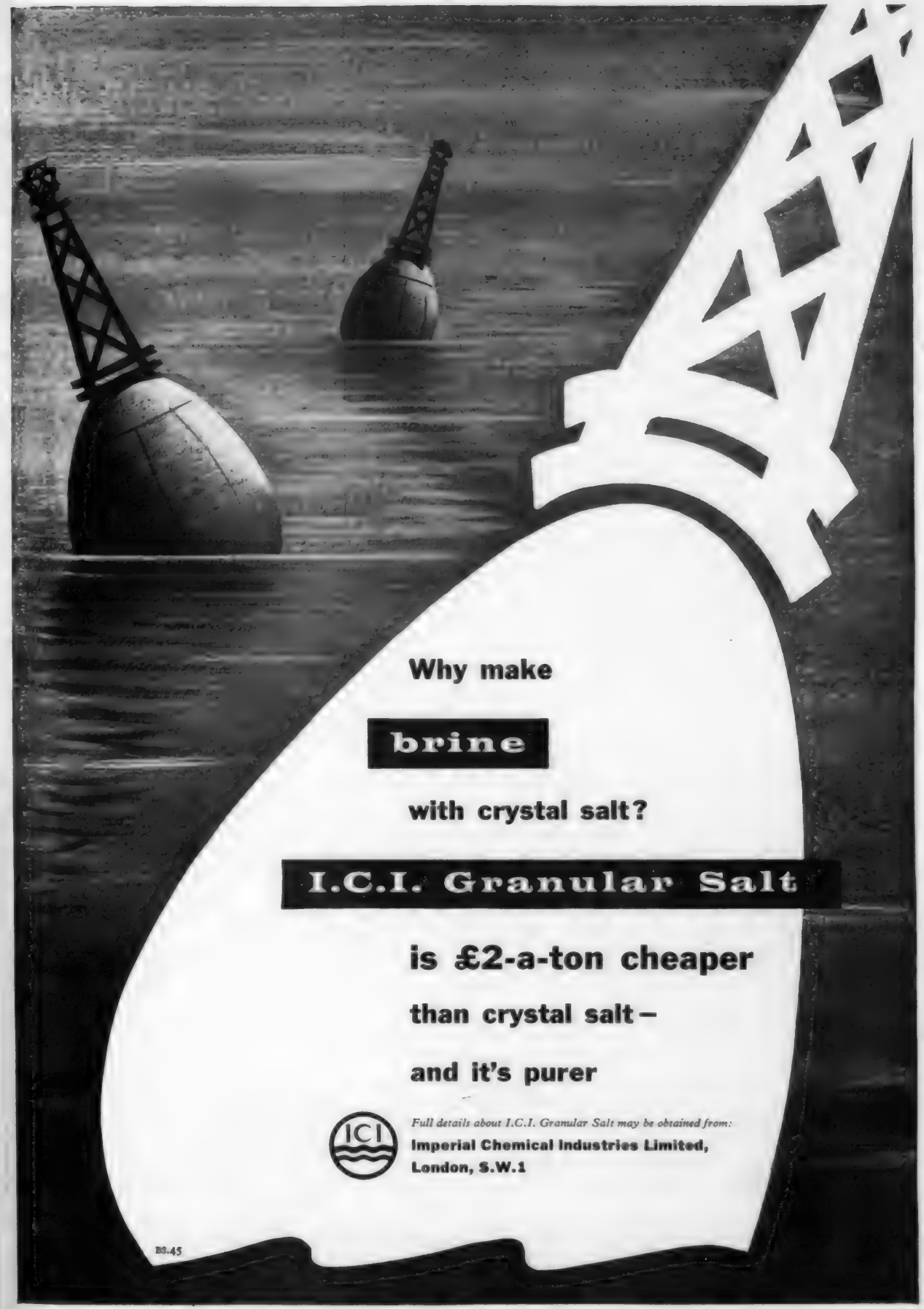
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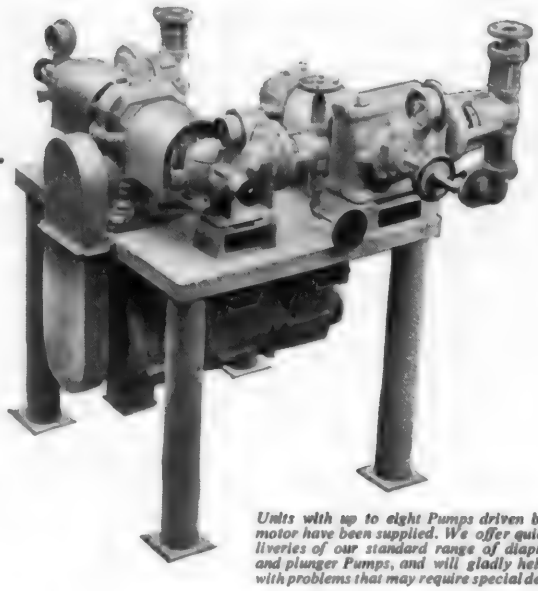

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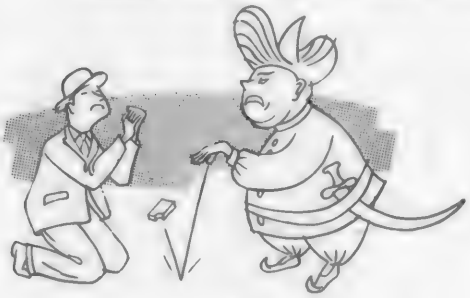
That their products did not always please.
In fact an Eastern potentate
Who previously for pleasure ate
Marshmallow only, murmured low
"It looks and feels like rubber, so
Have the agent imprisoned here
And send his company one ear".

The manager turned a delicate shade
Of green when one ear, post prepaid,
Arrived upon his desk one morn
Together with a note to warn
Of more to follow, perhaps feet,
Unless the goods improved "Toute suite"



The chemists, called to meet the chief,
Saw on his face the marks of grief
He said "My lads, disaster's struck
This fella says our product's muck
But SORBITOL *from H & S*
May save us from this dreadful mess"

This lucky thought quite saved the day
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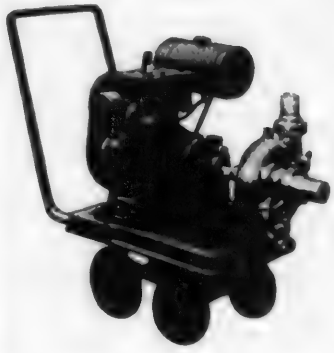

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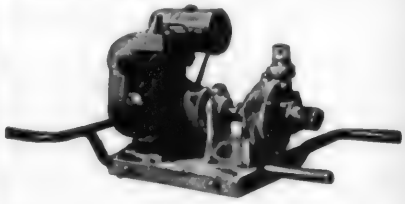

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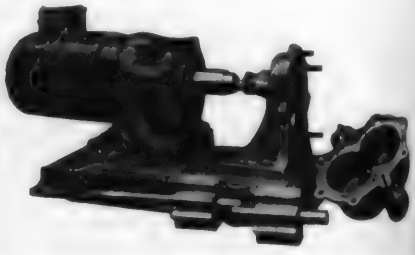
'Morton' Motor Driven Rotary Pump dismantled for cleaning.



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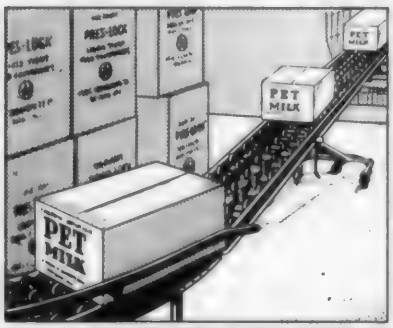

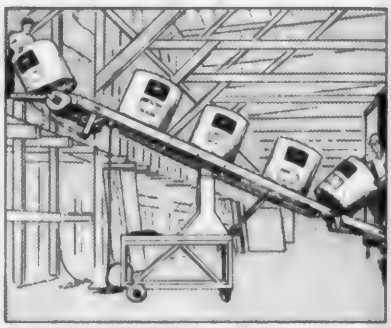

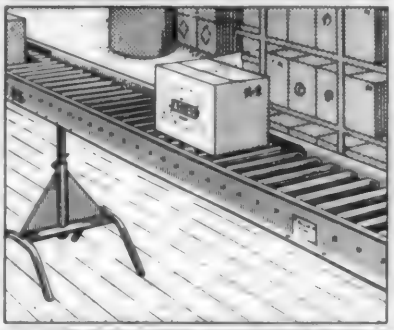

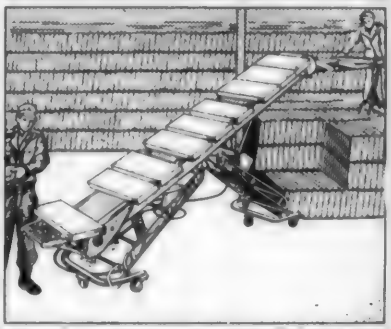

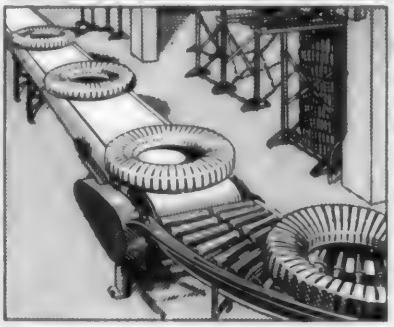

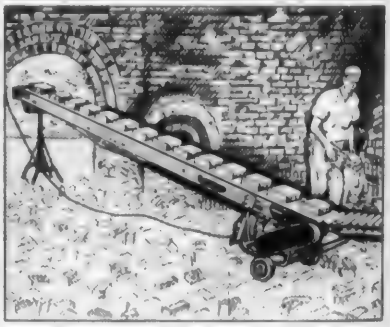

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FOOD MANUFACTURE

Vol. XXXI. No. 12 · Published Monthly · December 1, 1956

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A Publication of the Leonard Hill Technical Group—ENGLAND: Stratford House, 9 Eden Street, London, N.W.1. (Euston 5911). UNITED STATES: 3 Villa Drive N.E., Atlanta, Georgia; Statler Office Building, Boston 16, Massachusetts. BELGIUM: 171, Avenue des Croix du Feu, Brussels, 11. ITALY: Piazza Degli Affari 4, Milan; Via Filippo Turati 3, (Palazzo Giardino), Milan. SWITZERLAND: Forchstr. 99, Zurich 7/32. HOLLAND: Central Bureau Voor Verkoopontwikkeling, Amsterdam. GERMANY: Auf der Reide 20a, Dusseldorf-Unterrath; Friedrich-Ebert Str. 6, Frankfurt-am-Main.

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FOOD MANUFACTURE

Vol. XXXI, No. 12 December 1, 1956

Price fixing

OUR national life abounds in baffling contradictions, but surely the most puzzling concerns our attitude to price fixing. Collective price fixing has been stopped by the new Restrictive Trade Practices Act which came into force on November 2. Yet another form of price fixing flourishes and, indeed, seems likely to be extended. This is the price fixing of the marketing boards which control some of our basic foods. Mr. R. S. Worth, president of the Food Manufacturers' Federation, rightly deplored the fact that the food industry has to accept price fixing of its raw materials, when he spoke to the Scottish branch of the federation last month (see p. 529).

There are many arguments in favour of protecting our primary food producing industry—agriculture—but the fact must be faced that standard prices are not incentives to quality. It is generally accepted that free competition is the best assurance of getting the best quality of goods at the lowest price. The marketing board system is the reverse of free competition. To say this is not to condemn the basic aims of the system. A strong and healthy agricultural industry is vital to Britain in the truest sense of the word. But this does not give the farmer the right to dispose of everything he produces at a fixed price. The marketing board system should be arranged to give protection not only to the producer but to the consumer as well, in equal proportions. To ignore this is to make nonsense of the principles which inspired the passing of the anti-monopoly act.

Atomic preservation at tonnage level

HARD on the opening of the Calder Hall atomic power station comes news of another project for the peaceful use of atomic energy. The U.S. Army Quartermaster Corps is actively planning the construction of an atomic food preservation plant capable of processing 1,000 tons of food a month, which, it is hoped, will start operations in 1958 and which will be the first of its kind in the world. It will be called the Ionising Radiation Centre, and tenders for its construction have been submitted by eleven firms and are now being studied by the U.S. Atomic Energy Commission. The reactor will be water-moderated and fuelled with solid fuel elements. A preliminary design is being completed for the Commission by the Internuclear Co., of Clayton, Missouri. The reactor and ancillary equipment is expected to cost about $3 million. The other part of the plant, to cost about $4·5 million, will include a linear accelerator with a power of 60 kw and up to 20 million electron volts.

The prospect of a large atomic food preservation plant actually working in little over a year will surprise many food manufacturers, for it has been generally thought that the formidable problems involved—*e.g.*, bad odour and poor flavour—would take several years to solve. In the event the Americans appear to have made an all-out assault on the problems with a nation-wide research programme conducted by more than 60 universities, industries, foundations and Government agencies. Man-power and money have been lavished on research for the past five years, and the new plant will be the culmination of this immense effort which throughout has been financed and co-ordinated by the U.S. Army.

Several types of radiation sources have been tried out, including the waste products from nuclear reactors, high voltage particle accelerators, and radioisotopes. They were found effective for complete sterilisation and for pasteurisation, for the destruction of pests in stored foods, and for the inhibition of sprouting of potatoes and onions. Many "cold sterilised" foods, both cooked and uncooked, taste about the same as unprocessed food. These include chicken, pork, beef, fish, bread, asparagus, carrots, sweet potatoes and many fruits. But very poor results have been achieved with those important staple foods—milk, butter and eggs.

Clearly many problems remain, including the devising of convenient methods for packaging, handling, storage and transport of atomic processed foods. Above all, costs must be brought down if the new method is to compete with canning, freezing and chemical preservation. The new plant is expected to help solve these problems.

An attractive idea arising from the American studies is a mobile unit for cold sterilising food crops at marketing centres or in the fields. Details of a

static plant for processing potatoes were given in these notes in March 1955 (p. 93). Sufficient progress has now been made to envisage an atomic plant compact enough to be hoisted on to a lorry and sent around the farms at harvest time.

Whether we like it or not we are rapidly moving into the age of atomic food preservation. We look forward to news of the research programme of the D.S.I.R. in this country.

Unprofitable sugar

ALTHOUGH the British Sugar Corporation's annual report spoke of ideal conditions for beet growing and harvesting in 1955, sugar-beet growing is not apparently a glittering proposition to the farmer in every area. Nottingham University's Agricultural Economics Department has recently reported on the 1955 costs of growing the crop in the Midlands, in the areas of the Colwick and Kelham factories. Fifty-six farmers, with a total of 1,083 acres of sugar beet, provided costings for the survey. The results can only be called dismal. Total costs per ton of beet harvested were £6 10s. 1d. The total return per ton was £6 11s. 5d. This margin for profit, 1s. 4d. per ton, represents a mere 12s. per acre, for the average yield per acre in the survey was 9 tons. As is said in the report, this low margin is "due to the low yields rather than to high costs." And this comment is powerfully confirmed by comparing the 9 tons yield with the average national yield, 11¼ tons per acre, the third highest in records of British sugar-beet growing. How this area has fared in 1956 with its less favourable weather for beet must be apprehensively conjectured.

No crop is as well and consistently fed with fertilisers as sugar beet. It might be thought that in this low-lying area too little attention had been given to this factor. But on most farms 1 to 1½ cwt. of nitrogen, at least 1 cwt. of phosphoric acid, and 1½ cwt. of potash were applied per acre, which compares well with the full recommendations of 1, ½, and 1½ cwt. respectively of these major nutrients. Average expenditure on lime and fertilisers was nearly £12 an acre, or 20% of total cropping costs. The only possible weakness was that salt—a valuable fertiliser for beet—was not mentioned in the survey, but in Britain as a whole only about 1 grower in 5 is using salt yet, a remarkable failure to apply established modern knowledge.

Whether other areas also find the sugar-beet crop as poorly profitable—even in so good a year—is not known, but it seems highly undesirable for an area close to a Corporation factory to be so much below economic standard. Unless investigation can unearth the reasons and lead to better results, farmers will obviously turn to other crops.

Short-sighted food habits

A CURIOUS link seems to have been found between dietetics and ophthalmology by Dr. Peter A. Gardiner, research fellow in ophthalmology, Guy's Hospital, London. He has been studying the food habits of myopic children, and has found that short-sighted children, especially girls, are noticeably fussier about milk, meat, eggs and other sources of first-class protein than other children. Unfortunately for them they do not seem to make a particularly wise choice; the more active the myopia, the higher is the rate of refusal of protein foods.

The most striking difference between myopic and normal children is in milk consumption. Over a period all the children attending a school clinic for refraction were asked whether they consistently refused milk, cheese, meat, fish or eggs. Dr. Gardiner found that 15% of myopic children refused milk compared with 5% of normal children. Refusals of cheese, fish and eggs were also higher among the myopes than among those with normal eyesight. Boys with a highly active myopia have been reported to show a refusal rate more than twice that of boys who are not myopic, and girls a rate over 50% higher. Double refusals are twice as frequent amongst active myopes as amongst others.

Naturally Dr. Gardiner, who reports his findings in the *British Medical Journal* (1956 (4994) 699), is cautious in his conclusions. Whether or not myopia is connected with dietary habits is debatable but, generally speaking, the food pattern of myopic children is not basically abnormal, though there is some evidence (which Dr. Gardiner intends to publish later) that other food factors are involved.

The future of the can

IN SPITE of the growing popularity of paper, foil, and plastic wrappings and containers, some 50,000 million tinplate containers, capable of carrying about 30 million tons of perishable goods were made last year. These astonishing figures were given by Dr. W. E. Hoare, assistant director of the Tin Research Institute, speculating in the Institute's quarterly journal, on the future of the tinplate container during the next 15 years.

Dr. Hoare sees three broad possibilities: that tinplate production and consumption will continue to expand; that—to quote the president of the American Can Co.—"a very high percentage of all metal cans produced . . . will be tinless within the next decade"; and that new methods of preservation, storage and even of victualling might lead to the virtual elimination of the metal container. His conclusions were that tinplate production and consumption would grow and that he expected a production of tinplate in 1970 would be about 10 million tons

(compared to the present figure of 7,200,000 tons) with an associated tin consumption of 70,000 tons.

The rapid expansion of the tinplate industry is due primarily to the development of the electrolytic process which makes more cheap coating grades—perhaps fortified by a lacquer coating—available to the user. Where lacquering is obligatory—as with certain canned vegetables and for canned beer—it is obviously more economical to use low grade tin coatings.

The "tinless can" has a long way to go yet, according to Dr. Hoare. Aluminium has several disadvantages compared to tinplate, whose only serious competitor is lacquered steel. However, this would only have application in some of the less critical non-food applications and probably would not exceed 5% of present tinplate consumption. Food and beverage canning remains outside the ambit of the steel can.

As for the impact of new food preservation methods, radiation sterilisation is unlikely to be of any practical use for some years yet, nor is there enough experience of antibiotic-preserved foods. The so-called "aseptic" canning process, at present applicable only to fluid products, may have an interesting future, but the point about all these methods is that although they may reduce the strength requirements of containers, containers with much the same characteristics as the present tin can will still be needed. Even the composite frozen food package has become quite a good extra market for tinplate.

Wine and the weather

PREDICTING the quality of a current year's vintage is risky, but nobody is optimistic enough to believe that 1956 has been anything but a bad year for wine-growers and bibbers alike. Not only has the year produced indifferent wines, it has been disastrous. Storms have destroyed some of the finest vineyards in the Bordeaux district, where 20,000 out of 130,000 hectares of vines will have to be grubbed; in Burgundy the total yield is estimated as only 30-40% on an average year, while in Alsace some predictions are of yields as low as 25% of normal. In Germany severe spring frosts and hailstorms destroyed about 80% of the Sylvaner and perhaps 70% of the Traminer grapes.

The finer wines of France have suffered most. The trouble began with a warm January, which started the sap early, followed by three weeks of snow and frost which froze the sap in the stems, killing the vine above the graft and sometimes below. Such vines cannot be regrafted and growers must wait for five or six years for any kind of a yield after replanting. The vines flowered late, forming *coulure*, a number of small, green, hard grapes in each bunch which cannot be picked off but must be pressed with the rest. These grapes have no sugar and too much tannin and acid. They lower quantity and quality alike.

Besides losses due to the weather, the Germans are facing a wine shortage because of two other factors: their own increasing consumption, which has risen from five litres per head before the war to nine litres per head currently, and their lack of adequate reserves. If anything, the German wine-growing industry is worse off than the French. About 90% of French wine is *vin ordinaire*, which has long been over-produced, and to supplement this France has a huge reserve of cheap Algerian wine to bolster up a bad harvest. Growers are afraid that the German consumer will grow used to drinking cheaper foreign wines, for the "drought" has produced some pressure on the Ministry of Food in Bonn to lower or even remove the present tariff on foreign wines. To add to his problems, the German grower is finding that his overheads are going up and his labour is drifting to industry and the big towns. The position of the German wine-growing industry seems as delicate as the wines it produces.

Bakery gimmicks

"A POT-POURRI of items" describing new ideas and methods in American, Canadian, Australian and New Zealand bakeries was presented by Dr. J. B. M. Coppock at the annual meeting of the British Baking Industries Research Association recently.

During his tour of these countries, Dr. Coppock was struck by the great attention paid to details, however small, which often lead to the production of handy "gimmicks." How many loaves of bread are concertinaed by too many being handled at once by the operative? All this was simply overcome in one bakery by using a light duralumin scoop with two handles, with which the operative picked up 6 to 8 loaves at a time without danger of damage. In another bakery the windows were protected from the ingress of flies by an "insect-o-cutor," a series of wires through which a high voltage passed, sufficient to kill flies and other insects, and so arranged that the insects had no chance of falling into the products.

Another company had fitted their delivery vans with thin polished boards, resting on angle irons, traversing the whole length of the van. The loader placed the products on the polished board, gave a slight tug towards himself, whereupon the products migrated up the boards. To unload, the roundsman gave a slight push away from himself, when the products slid conveniently to his finger tips. Another device was a quick way of feeding dough pieces for rolls into the oven by sliding them on corn meal; at the same time it produced a home-baked look!

In another bakery, buns for icing were passed underneath a depositor in rows of 8; difficulties, however, had been experienced in occasional rolls lifting and fouling the depositor. This had been overcome by fixing 8 wires stretching above the rolls at a convenient distance to prevent them from lifting.

There was a great tendency for the baking of rolls to be done in recessed baking sheets, 32 rolls to a sheet, four in a line, adjacent lines being staggered. Silicones were used as pan glaze quite extensively, and it was said that very little trouble was experienced in the roll release.

In Toronto a biscuit firm prepared their batters for the manufacture of wafer cones in a mixer of the fat homogeniser type. One of their problems was stringiness of the batter, which they claimed they could overcome by the incorporation of suitable amounts of tapioca flour. The batter after preparation was stored in a stainless steel batter tank, the feed for which was controlled by nothing more than the conventional ball-cock which is found in the cloakroom cistern. In other words, many of the American gimmicks are nothing more than adaptations of everyday appliances. On the other hand, others were most carefully thought out; thus the wire bands in the travelling biscuit oven at one plant consisted of a series of closely packed and interlocking V-shaped links 3/5th in. long. They claimed this wire band had a greater adaptability than most. The crackers at this organisation were baked to a 3% moisture and had a *p*H of 7·4. The final dough was prepared from a 5-hr. sponge, fermentation time being 19 hr.

Groaning tables

CHRISTMAS is the time when we are reminded of feasts. Some monster dishes have been prepared in the past, several of them as part of the Christmas festivities.

The largest Christmas pudding was made at Paignton, Devon, in 1858. Among its ingredients were 573 lb. of flour, 382 lb. of suet, 473 lb. of raisins, 95 lb. of sugar, 191 lb. of bread crumbs, 500 lemons, 150 nutmegs, large quantities of spices, hundreds of eggs and 360 quarts of milk. When cooked and ready to eat it took a team of horses to haul it to its destination. This pudding was made under the terms of a special charity which provides for the making of a similar "monster" every 50 years.

In 1770 a mammoth Christmas pie was ordered by Sir Henry Carey. It contained four large turkeys, four geese, four ducks, six snipe, six pigeons, two rabbits and two ox-tongues. The pie weighed 200 lb. and when baked was mounted on wheels and driven by road from Berwick to arrive in London on Christmas morning.

Just before the First World War a London confectioner made the largest Christmas cake on record. It measured 12 ft. round the base, stood 6 ft. high and weighed three-quarters of a ton.

The largest turkey ever raised in Britain was bred on Lord Rothschild's estate in Hertfordshire. It weighed 44 lb.

Many other huge dishes have been prepared for special occasions. The series of giant pies made by the people of Denby Dale, Yorkshire, were remarkable cooking feats. The first was made in 1788 to form part of the general rejoicing in George III's recovery from a serious illness.

It was such a success that an even bigger pie was produced in 1815 to mark the defeat of Napoleon Bonaparte. Then in 1846 the Corn Laws were repealed, and this prompted the Denby Dale cooks to surpass all previous records. Into the pie baked for this momentous occasion they put 100 lb. of beef, five sheep, a calf, huge quantities of hares, rabbits, pheasants, turkeys, grouse, ducks, partridges, guinea-fowls and pigeons. It was baked for 10 hr. and gave off such an appetising aroma that a crowd of 1,500 people tossed the pie from its platform and fought each other for the pieces.

On August 14, 1887, Denby Dale folk produced their biggest pie to commemorate Queen Victoria's Jubilee. It contained 1,850 lb. of beef, 21 ducks, 42 fowls, 40 pigeons, 100 small birds, 64 rabbits, and ½ ton of flour was used for the crust. Its total weight amounted to 2½ tons. It was drawn to the feasting place by ten horses, but the tragedy was that when cut it was so "high" that it could not be eaten. It was quickly buried in quicklime and another of humbler proportions prepared with all speed.

Another great feast was arranged to celebrate Queen Victoria's Diamond Jubilee. Princess Alexandra conceived the idea of staging the biggest banquet in the world by providing a dinner for 400,000 poor Londoners. Very few people thought such an extravagant project possible, but with financial support and expert advice from Sir Thomas Lipton, the Princess succeeded in making the meal a reality, and it was served by 100,000 waiters.

The Germans are renowned for their sausage making, but in 1601, they produced a really monster sausage. When finished it stretched for 3,000 ft.—over ½ mile. There must have been considerable congestion in the streets of Koenigsberg when it was carried through the town on the shoulders of the 103 butchers who worked together to make it.

An American publicity stunt for eggs produced a giant omelette at Vineland, New Jersey, a few years ago. It was made with 2,100 eggs and put into a frying pan measuring 40 ft. round the rim and 13 ft. in diameter. The frying was done by infra-red rays and the mixture stirred with garden rakes.

ELECTRONICS Control Coffee Roasting

Britain's growing partiality for coffee has led to the Kenya Coffee Co. building a new factory in London, centre-piece of which is a £75,000 electronically-controlled coffee roaster.

"LESS aroma in the packet and more taste in the cup" is the claim made by the Kenya Coffee Co. Ltd. for the coffee now being produced at their new factory in Earlsfield, London. The main feature of this factory is a £75,000, German - made electronically - controlled roasting plant, but the whole layout is an impressive example of efficient planning. Although the new factory has a productive capacity of 5 million lb. of coffee in various blends per year, its total manufacturing area takes up no more than 2,500 sq. feet.

Coffee is enjoying a renewed popularity in Britain, for which credit must go to the increasing number of espresso coffee bars in most large cities. The primary function of the Kenya Coffee Co. is to supply the catering trade, including a large number of these coffee bars. The company has now decided to devote more of its facilities to the scientific study of coffee processing and to the establishment of better methods. In this connection it has the backing of the John Gardner Group—which has a large interest in the catering and allied trades—of which it is a member.

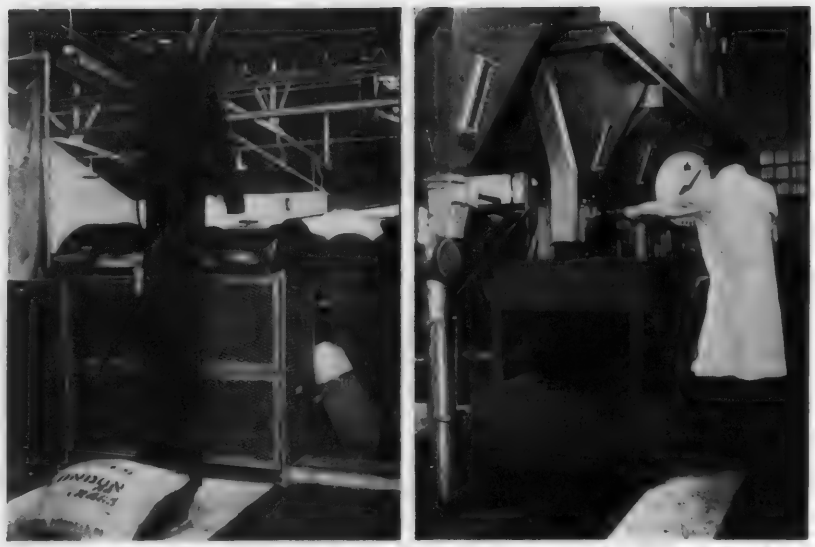
The Earlsfield factory is an example of this new policy. All operations have been work-studied and the company has successfully eliminated overtime amounting to 14 hr. weekly per employee. In spite of this, Kenya Coffee claim that employees' weekly wage packets have not been reduced.

(*Above*) ROASTING. **Kenya Coffee's new electronically-controlled roaster is on the left of the larger photograph. In the background are the hoppers where the blended beans are left to condition. The operator on the left is setting the control panel of the roaster.**

Blending and conditioning

The main processes at Earlsfield are blending, roasting, grinding and packaging. Raw green beans are brought into the factory in sacks and stored until required according to their country of origin. As the company's name implies, much of the coffee comes from Kenya, but it is by no means restricted to this country, and beans are received from plantations all over the world.

Raw beans in quantities according to the blend required are poured through a chute into cleaning machines below floor level and all lint, strings, hulls and other



BLENDING. (*Left*) **Green raw beans are carried by this elevator into the rotating blending drum. (*Right*) Blended beans are allowed to condition in these hoppers before being weighed into charges for roasting.**

foreign matter are removed. The cleaned beans are then carried by a short elevator and poured into a rotating blending drum. After blending the coffee passes by forced air draught and conveyor belting to storage hoppers, where it is allowed to rest and condition.

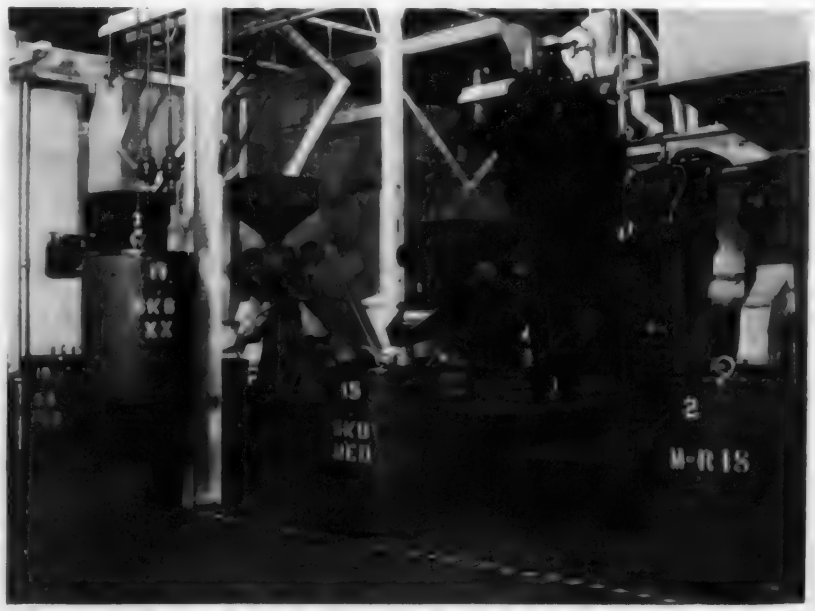
This stage of the operation shows an interesting use of pneumatic and mechanical handling techniques. The blended beans are sucked through pipes on to a broad conveyor belt travelling horizontally across the top of a battery of eight hoppers. As each charge of blended beans travelling on the belt reaches its hopper a lever is pulled and the beans are deflected inside. Each blend is contained in a separate hopper.

A carriage, carrying on its platform a hopper and a weighing machine, travels on tracks under the outlets of the storage hoppers. The coffee is weighed into charges which are dropped into a hopper below the floor and, when required, pneumatically fed to the roasting machines.

Roasting—old and new methods

Kenya Coffee still use a gas-heated, hand-controlled coffee roaster for special blends and other purposes, but most of the coffee is fed into the electronically controlled machine—one of only two of its kind in Britain and the only one used for the production of roasted, ground coffee as such. The conventional coffee roaster consists of a perforated metal cylinder enclosed in an insulated metal jacket provided with suction openings for the circulation of the heat stream. Flame-heated gases, tempered to the proper degree in the burner chamber by mixture with the relatively cooler gases returned by recirculation, enter the roasting chamber. Means are provided to control the circulation and hence the temperature inside the roasting cylinder. The operator therefore, has the problem of regulating the heat and deciding just when the desired roasting has been accomplished. Coffee beans vary greatly in their moisture content, consistency and in various other characteristics, and the roasting operator must be able to draw his own conclusions from their state. Trained study, a delicate sense of timing and years of experience are necessary for the skilful roasting of coffee, and no operator is so efficient that further improvement is impossible. The company's experiments have shown that, even with the most experienced operators, errors of as much as 15% are possible.

The electronic machine has the advantage that, once the machine has been set for one blend and for one colour, beans will be roasted according to these requirements automatically, indefinitely and to a uniform quality. Beans enter the roasting cylinder, while the roaster charges itself to a temperature of 320°C. The operator sets the dials on an electronic control panel to cut off the roast when a



GRINDING. **Different grinding machines for different textures. The American-built "Gump" granuliser (second from right) gives a very uniform, clean-cut grind. Note the specially designed containers for ground coffee.**

PACKAGING. (*Left*) **Ground coffee cannot be exposed to air. The special containers are electrically hoisted and emptied over the filling machine.** (*Right*) **Filling bags. Coffee is also vacuum packed in cans.**

certain colour has been reached. After coffee has been in the roasting cylinder for a short time the beans become a yellowish-brown colour, which gradually deepens as they cook. At the same time the beans shrivel up as they are heated until they reach the developing point, at which stage they begin to swell, increasing as much as 50% in bulk. If, as in some blends, the beans are required to develop, an interrupter is turned on at the control panel, which cuts off the heating coil at various intervals so that the beans are allowed to swell. After the heat has been fully turned off for a predetermined time it automatically comes on again to the next required temperature. When the heat is cut off the second time, a discharge shutter is automatically opened and at the same time a cooling fan is switched on.

The coffee is automatically sucked into containers and, as it leaves the roaster, the discharge shutter closes and the heat is automatically switched on again. The roaster builds up once more to charging heat, when the next charge is turned into the preheating chamber and the whole operation starts again.

The roasted coffee is blown into a series of hoppers suspended on rails, where it is again weighed. Coffee loses weight by roasting, the loss depending on the kind of bean, its age, and the style of roast. The average loss is about 16%. From the weighing hoppers the roasted coffee is conveyed pneumatically to one of four grinding machines, depending upon the texture required.

Grinding and packaging

The company's latest acquisition is an American machine, a Gump 77 granuliser, in which no plates are used. This is a triple reduction roller grinder on which the rolls carry a patented grooved system which ensures uniformly ground, clean-cut coffee. The size of the grind is controlled by a single lever adjustment to any one of 10 sizes. Clean-out controls are provided on the machine, making it easy to change from one grind to another and from one blend to another. The grinder has a capacity of from 1,200 lb. per hr. of the finer grinds to 2,000 lb. per hr. of the coarsest. Only very minute quantities of dust are carried into the ground coffee.

The ground coffee cannot be exposed to the air, so that pneumatic conveying is not possible. It is discharged from the grinders into containers which are electrically hoisted over a vacuum packaging filler. The containers are specially designed for this purpose and when positioned over the filling machines they are electrically controlled so that the bottom of the container falls open and the coffee is discharged into a hopper over the filling machines. Coffee is packed in paper bags lined to prevent the loss of aroma and carbon dioxide, or vacuum packed in cans.

Should ANTIBIOTICS be used as Food Preservatives?

AMERICAN EXPERIENCE AS A GUIDE

By Dr. Ella M. Barnes*

The question posed by the title is one of the most controversial in the food industry today. Against the undoubted efficacy of certain antibiotics in preserving some foods stands a number of objections, most of them based on the fear that unscrupulous processors might use antibiotics as a substitute for good hygiene. The U.S., which has extremely strict food laws, has permitted limited use of antibiotics. What has this experience revealed? What has further research disclosed? Dr. Barnes recently went to the U.S. to find the answers to these questions. Here they are.

IN November, 1955, the Federal authorities of the U.S.A. published a regulation (under the Pesticides Chemical Amendment to the Federal Food Drug and Cosmetic Act) permitting the use of "Aureomycin" (chlortetracycline) for the preservation of uncooked poultry.[1] This has given a new impetus to research in this field. The American Cyanamid Co. who make aureomycin and Chas. Pfizer and Co. Inc. who make the other two closely related tetracycline compounds—"Terramycin" (oxytetracycline) and tetracycline, are devoting considerable resources to research extending the use of these antibiotics to other foods. In addition, many antibiotics previously discarded for medicinal purposes are being reassessed for food preservation.

The research programme generally can be divided into (1) preservation of poultry, fish, meat and whales; (2) canning — meats, vegetables and fruits; (3) precooked frozen foods; (4) dairy products, brewing, etc.

Poultry

Results obtained both in research establishments and commercially, demonstrate that aureomycin is extremely effective in extending the storage life of chilled eviscerated poultry, although it has little beneficial effect on poultry held at higher temperatures.

It has been demonstrated repeatedly that no other antibiotics are as effective as the tetracyclines for poultry preservation. There is a divergence of opinion as to the relative merits of aureomycin, terramycin and tetracycline, but most people find that aureomycin gives a longer extension of shelf life than terramycin (Table 1). Too few experiments have been carried out with tetracycline to make an accurate comparison. The reasons for the differences in the effectiveness of these compounds are unknown as very few detailed bacteriological investigations have been made.

There is complete agreement over the necessity of combining the aureomycin treatment of poultry with good hygiene and refrigeration. This is the main safeguard against the multiplication of resistant food poisoning salmonellas and staphylococci. The resistance of many staphylococci to aureomycin is well known; what is less appreciated is that some of the *Salmonella* species are resistant to the tetracycline compounds and there is a high incidence of salmonellas in the gut of chickens and turkeys.

The food grade of aureomycin chlortetracycline is used in a product called "Acronize." The conditions governing the use of the Acronize for eviscerated poultry are very strict.[2, 3] They were worked out in consultation between the American Cyanamid Co. and the Food and Drug Administration as well as the Poultry Inspection Branch of the U.S. Department of Agriculture. Acronize can only be used in plants fulfilling the required standards of hygiene, chilling and other conditions prescribed for processing. By May 31, 1956, 113 plants had been rejected, whilst 153 plants had been approved of which 20 had first been rejected but later improved their operations to qualify for a franchise.

Fish

So far, the only useful antibiotics for the extension of the storage life of fish are the tetracyclines, and both Tarr[4] and Farber[5] found aureomycin to be the most effective. American Cyanamid have now formally applied to the Canadian Food and Drug Administration for permission to use aureomycin in ice for fish and this was granted on September 26, 1956. One of their most difficult problems is to devise a suitable method of franchising to prevent the aureomycin being used under poor hygienic conditions. A number of commercial trials were carried out at the Pacific Fisheries Research Laboratories, Vancouver, during the summer.

The position in the U.S.A. is not as advanced as that in Canada partly because fish is a less important industry and partly be-

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Table I. Some data on the use of the tetracycline compounds for the preservation of eviscerated poultry

Condition of poultry	Storage Temperature	Time to spoilage: Control	10 p.p.m. aureomycin for 2 hr.	10 p.p.m. terramycin	10 p.p.m. tetracycline	References
Cut up poultry dry packed (wrapped) ...	3°C.	2 weeks	4 weeks			Kohler, Miller and Broquist[14]
Whole eviscerated birds (wrapped) ...	3°C.	2 weeks	3-4 weeks			" "
Eviscerated birds	1·5°C.	10 days	22 days	18 days		Winters (Pers. com.)
(wrapped)	13°C.	3 days	4 days	4 days		" "
Birds packed in evacuated polythene bags	4·4°C.	7 days	12 days	10-11 days	9 days	Ayres, Walker, King and Fanelli[15]

cause the most extensive work has been carried out at the Canadian Pacific Fisheries Research Laboratories. The U.S. Federal Authorities are closely observing the Canadian trials.

It has now been found that the use of aureomycin for fish preservation gives little benefit without refrigeration. Hence the treatment of menhaden fish, which are caught for fish meal and oil and stored unrefrigerated, has been discontinued. Experiments are being carried out on the effect of the aureomycin treatment of fish on subsequent smoking and curing. Good results have also been obtained by the incorporation of aureomycin with the salt for sardines before canning. The storage life of shrimps may be increased by dipping in iced water containing aureomycin, rather than only by packing in aureomycin ice.

Chas. Pfizer and Co. Inc. are also actively experimenting with terramycin for fish preservation.[6]*

Meat

Experiments with meat are well behind those with poultry and fish, but the Meat Inspection Division of the U.S. Dept. of Agriculture has now sanctioned "in plant" experiments with aureomycin. They are only authorising the spraying of the more heavily contaminated parts of the carcase, *e.g.* backbone, diaphragm inside and outside, foreshank and hind shank. Firms are also experimenting with spraying prime cuts before ageing. Emphasis is again laid on the use of antibiotic with refrigeration.

Many conflicting results have been obtained with meat, particularly with regard to the stability of the antibiotic in the muscle tissue, and at the moment the meat packers are not enthusiastic. They point out that with good refrigeration aureomycin is not necessary and in any case they usually get a surface growth of moulds (which are insensitive to the tetracyclines) after about 2 weeks storage at 34-36°F.

Following the work of Deatherage[8] both American Cyanamid and Chas. Pfizer are studying the preservation of meat at room temperatures either by infusion of the carcase at slaughter or injection of the antibiotic several hours before slaughter. Good results have been obtained with both terramycin and aureomycin, but there are many uncontrolled variables in these experiments, such as the condition of the animal at slaughter. The experiments are very costly as they involve wasting whole carcases, and are not being contemplated at present by the meat firms of the U.S.A.

Antibiotics are also being tested in minced meat and ham and bacon curing.

Whales

Following successful preliminary trials[9] the Pacific Fisheries Research Station is treating 50 whales with aureomycin this summer by pumping 100 g. into the peritoneal cavity when they inflate the animals. They will be compared with 50 controls in respect of the quality of the oil.

Canning

The use of antibiotics in low-acid foods to allow reduction in heat treatment below the minima that are accepted as safe against the survival of *Cl. botulinum* is not recommended, as both nisin and subtilin resistant strains of *Cl. botulinum* have been isolated, and these are the only effective antibiotics in this field so far. Experiments are continuing on the use of subtilin in acid foods where there is no risk of botulism, and good results have been obtained in the control of flat sour spoilage of tomato juice.[10]†

Pre-cooked frozen foods

Antibiotics are being tested for the control of sporing organisms in pre-cooked frozen foods.

Miscellaneous projects

Antibiotics are being tested in milk, cheese and other dairy products. Polymyxin is being used by some brewers in the early stages of fermentation to control contamination. This is legally permissible in the U.S.A. so long as it is not present in the finished product.

General considerations

Resistant Organisms. So far no really effective experiments have been carried out on the build-up of an antibiotic-resistant flora in a food processing plant. The commercial use of aureomycin for poultry preservation is too recent

* In Great Britain also, trials have been carried out by the Torry Research Station on the effect of incorporating aureomycin in ice on the storage life of fish, with beneficial results.[7]

† Experiments are in progress in Great Britain at the Fruit and Vegetable Canning and Quick Freezing Research Association, Chipping Campden, on the use of nisin in canned vegetables to control bacteria, particularly thermophiles, of a higher order of heat resistance than *Cl. botulinum*.

to indicate whether there will be a loss of effectiveness in time.

Moulds and Yeasts. When antibiotics such as the tetracyclines are used the moulds and yeasts are not inhibited. Some of the antifungal agents like sorbic acid are being tested in combination with the antibiotics. These substances are also being combined with low radiation doses, the final combination being a refrigerated food treated by low dosage radiation and aureomycin or terramycin and sorbic acid.

Toxicity. Although there is well-documented evidence of the non-toxicity of aureomycin when taken orally for long periods,[11] the Food and Drug Administration (U.S.A.) are only sanctioning its use when a complete destruction on cooking can be demonstrated. Although this is possible with poultry, results with fish seem to be more variable, and there has been considerable difficulty with meat—active residues even being found in fried chops. Aureomycin can be detected down to 0·025 μg./g. in tissues. One of the difficulties with regard to recognition of terramycin as a food preservative is that the assay method is about 5 times less sensitive than for aureomycin. The question of the toxicity of the inactivated residues of aureomycin and terramycin is being studied extensively. It has now been shown that the inactive aureomycin residue in cooked poultry is isoaureomycin, and is identical with a normal degradation product of aureomycin administered to animals. Rats have been successfully maintained on a diet containing 1% isoaureomycin for 6 months.[12]

Table 2. Effect of cooking on residual levels (in μg. per g. tissue) of aureomycin in chicken breast muscle (data of Kohler, et al.[14]—their Table 3)

Cooking procedure and time (min.)	Muscle dipped 15 min. in soln. with aureomycin (μg. per ml.): 3	10	30	100	300	1,000
Boiled						
0	0·34	2·2	3·4	23·0	32·0	115
5	0·65	0·11	0·28	2·6	1·6	8·0
15	nil	nil	nil	nil	0·45	0·45
30	nil	nil	nil	nil	nil	nil
Roasted (230°C.)						
0	0·73	3·1	5·75	12·0	30·0	130
5	0·65	0·33	0·58	1·9	3·9	29
15	0·25	0·13	0·14	0·14	0·13	0·8
30	nil	nil	nil	nil	0·09	0·3
60	nil	nil	nil	nil	nil	nil

The opposition to the use of antibiotics may be summarised as follows:

(1) The danger that in the hands of unscrupulous processors the antibiotics would be used as a substitute for good hygiene.

(2) The danger that antibiotics might eliminate the normal spoilage organisms which characteristically alter a product in a manner generally recognised as indicating that it is potentially dangerous. The food could be heavily contaminated with pathogens, but there would be no indication of this from off flavours.

(3) The danger of the selection or development of resistant pathogens—particularly the food poisoning staphylococci and some salmonellas. A case was recently reported of chinchillas fed on rations containing aureomycin which succumbed to staphylococcal enterocolitis; aureomycin-resistant staphylococci were isolated.[13]

(4) The cumulative effect of inactive residues.

(5) The possibility that the wide extension of the use of medicinally important antibiotics may diminish their therapeutic value.

For and against

Food technologists generally are in favour of a limited use of antibiotics, but only if it is accompanied by good hygiene and refrigeration for fresh foods. Except for a few experiments on the high temperature ageing of beef, almost all of the experiments in the U.S.A. are directed towards using antibiotics under refrigerated conditions and with "clean" products.

The author wishes to acknowledge the generous assistance she received from scientists during her visit to the U.S.A.

This paper was prepared as part of the programme of the Food Investigation Organisation of the Department of Scientific and Industrial Research.

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▶Besides a number of excellent illustrations of their works and range of machinery for the brewery and soft drinks industry, H. Pontifex and Sons have included in their new catalogue an additional pamphlet in colour, describing the multi-pass plate heat exchanger machine. The working of this machine for pasteurisation is clearly shown in diagrams.

Anærobic Digestion of Waste Waters from Slaughter-Houses

By R. Lloyd, B.Sc., and G. C. Ware, M.A., Ph.D.*

Anærobic digestion is a method of treating waste waters from slaughter-houses and meat product factories in which the liquid is kept from air to promote the break-down of the complex organic compounds with the liberation of methane and CO_2. The method has been tried in New Zealand and the United States. The experiments described in this article suggest that it would also be practicable for use under British conditions.

WASTE WATERS from slaughter-houses and meat products factories contain high concentrations of putrescible organic materials in solution and suspension, and cannot be treated by the ordinary biological processes used for treating sewage unless they are first considerably diluted. In many cases the waste waters can be discharged to a public sewer, and after dilution with domestic sewage, are treated without difficulty at the sewage works.

Sometimes, however, slaughter-houses are situated in areas where no public sewer is available or where the local sewage works serves a small population and would be overloaded by the waste from the slaughter-house. In such cases waste disposal is a difficult problem.

Methods which have been used for treating slaughter-house waste waters have been summarised by Gold.[1, 2] These methods include anærobic digestion — a process commonly used for treating sludge at sewage works—in which the liquid is kept out of contact with air and anærobic break-down of the complex organic compounds occurs, methane and carbon dioxide being liberated. During recent years the use of this process has been investigated in both the United States[3] and in New Zealand.[4] The efficiency of the process may be greatly affected by the conditions of operation, such as temperature, amount of stirring, and period of retention. In the United States a pilot plant

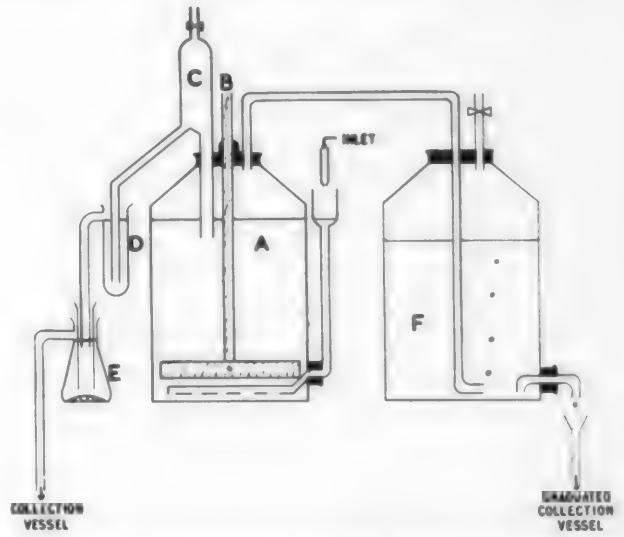

Fig. 1. Diagram of experimental anærobic digester, capacity 10 litres.

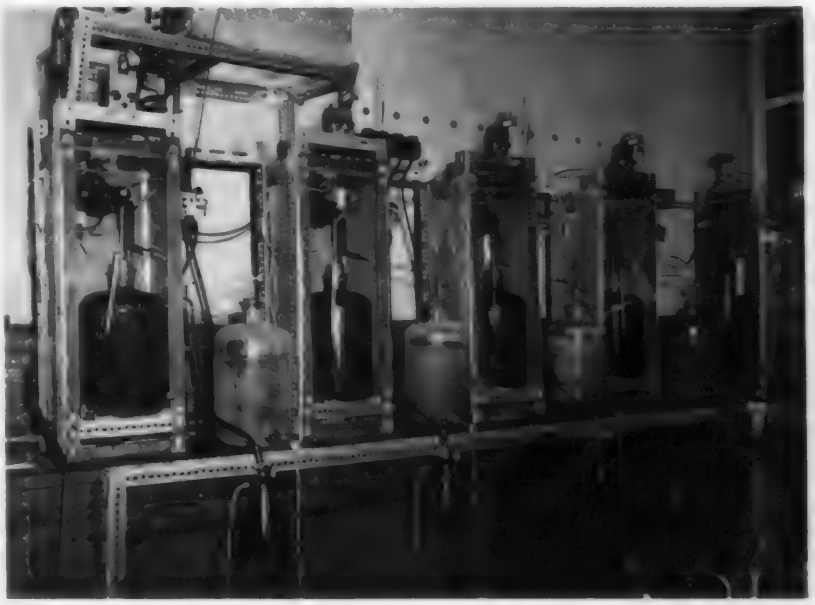

Fig. 2. Series of 10-litre digesters maintained at different temperatures.

* Water Pollution Research Laboratory, Stevenage, Herts.

built at a large meat packing plant was operated at a temperature of 35°C. and the contents of the tank were mixed by pumping from the bottom to the surface. A period of retention of only one day was used, and the effluent contained some sludge which was still producing gas and so did not settle easily. Settlement was improved by vacuum degasification and addition of "fly-ash" to increase the weight of the sludge. The efficiency, measured by reduction in biochemical oxygen demand (B.O.D.), was 90 to 95%.

In the New Zealand work the digester was not heated and the temperature varied from 12·5° to 25·5°C.; the contents were stirred by horizontal paddles. Vacuum degasification was used, and when the period of retention was 2½ to 3 days the reduction in B.O.D. was between 75 and 90%—temperature having a marked effect on efficiency.

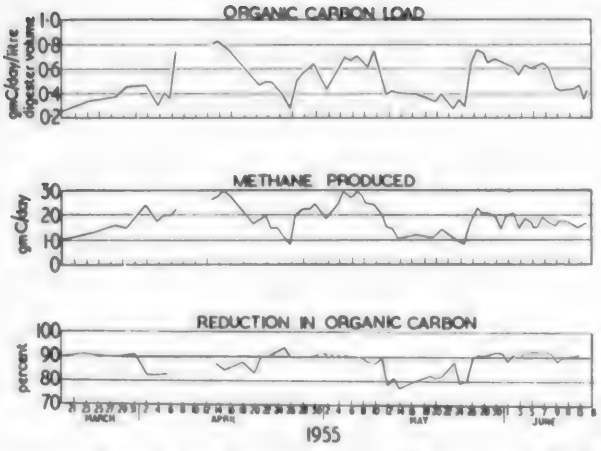

Fig. 3. Variations in load, gas production, and efficiency in a 10-litre digester operated at 35°C.

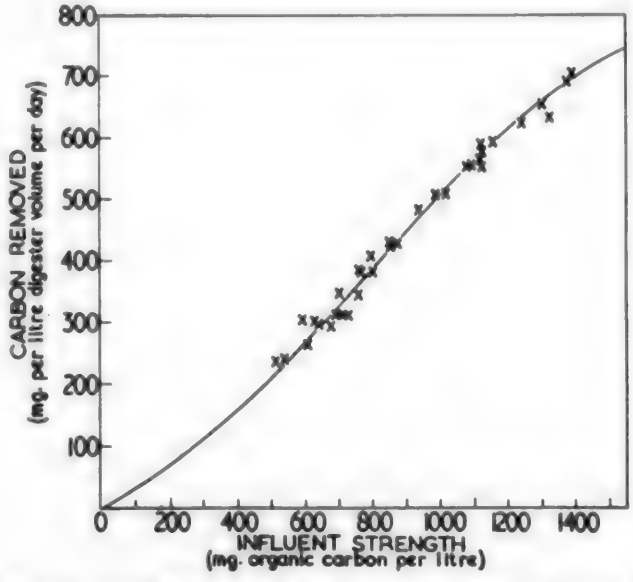

Fig. 4. Effect of strength of influent on the removal of organic carbon in a 10-litre digester operated at 35°C. Period of retention, 43·9 hr.

Experimental programme

As it was thought that anærobic digestion might be a practicable method for treating waste waters from some slaughter-houses in the United Kingdom, the Water Pollution Research Laboratory has made some small-scale experiments to determine the best conditions for the process.

Effluent was obtained from a slaughter-house where about 75 head of cattle, 200 sheep, and 2,800 pigs are slaughtered per week, and where some manufactured products, such as meat pies, are prepared. The waste waters contain excreta from the stock yard, gut and stomach washings, fats, oils, blood, and watery extracts from cooking processes. Samples were taken from the influent to the settling tanks at the factory, and so contained a considerable amount of coarse suspended matter. As this could not be handled in the small-scale experimental digesters, it was allowed to settle before use. The strength of the effluents varied very much, both from day to day and from hour to hour, depending on the numbers and kinds of animals being slaughtered; in particular, there was a sharp rise in the content of blood when a large animal, such as a bullock, was stuck. The effluent was usually collected during killing hours in order to obtain a strong liquor, but some experiments were made with selected weak liquors.

Table I. Composition of meat wastes used in experimental work in United States, New Zealand, and at the Water Pollution Research Laboratory

	United States		New Zealand		W.P.R.L.	
	Range	Average*	Range	Average*	Range	Average
Suspended solids (p.p.m.) ...	181-908	653	779-3869	2044		
Volatile solids (p.p.m.) ...	1060-1567	1431				
Biochemical oxygen demand (p.p.m.)	950-1641	1412	1022-3490	1981	750-3320	2326
Permanganate value			140-634	278	103-270	219
Organic carbon					313-1300	931
Total nitrogen	99-159	135				
Kjeldahl nitrogen					89-493	281
Ammonia			21-79	39		40
pH value			6·3-10·5			7·0

*Averaged from the figures for individual runs given in Refs. 3 and 4.

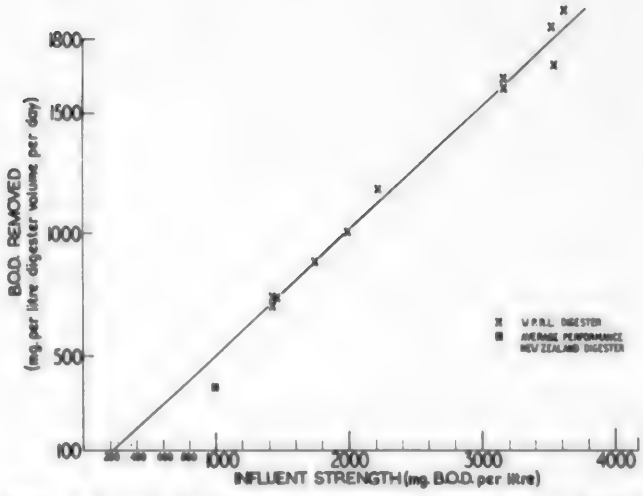

Fig. 5. Effect of strength of influent on reduction of B.O.D. in a 10-litre digester operated at 35°C. Period of retention, 43·9 hr.

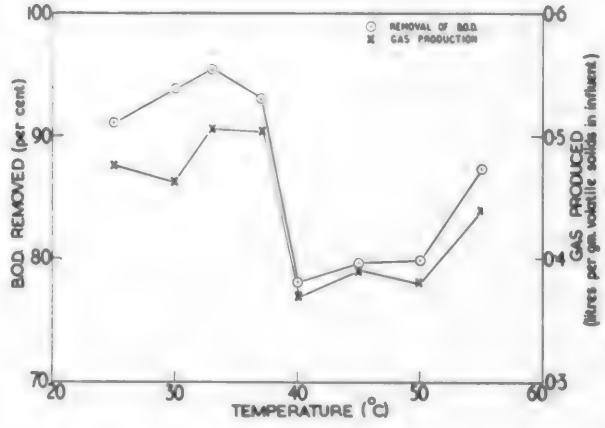

Fig. 6. Effect of temperature on gas production and removal of B.O.D. in 10-litre digesters. Average results over period of 10 weeks.

The composition of the waste used is given in Table 1, where it is compared with that of the liquids used in the American and New Zealand experiments.

In preliminary tests, samples of the waste water were placed in 500-ml. flasks and were inoculated with soil, dried sewage sludge, or sludge from the digestion tank at a sewage works where meat wastes are normally treated. Satisfactory digestion was initiated only when the sludge from the digestion tank was added, and this was therefore used in further experiments. These preliminary experiments also showed the importance of the correct degree of stirring. Vigorous stirring, whether continuous or intermittent, caused the sludge flocs to be broken down; the fine sludge was then either carried over with the effluent or it collected as a crust on the surface of the digesting liquid. With no stirring a heavy inactive sludge was formed and little purification was achieved. With continuous slow stirring, however, good digestion was obtained and the sludge could be removed from the effluent by settling.

To obtain information on the degree of purification that could be effected by digestion the experiments were continued in 10-litre vessels (Figs. 1 and 2).

Crude meat waste from a storage tank was introduced to the digester, A, through an apparatus designed to deliver a set volume of liquid each minute. The contents of the digester were stirred at 13 r.p.m. by a stainless steel stirrer, B, with polythene blades, $\frac{1}{2}$ in. or 1 in. wide, extending to within 1 in. of the walls. Effluent was displaced through a siphon to a 500-ml. flask, E, in which sludge settled, and then overflowed to a 10-litre collecting vessel. The sludge was returned to the digester at intervals. The traps C and D prevented breakage of the siphon by gas bubbles. Gas evolved in B was collected over water in the aspirator, F, and the liquid displaced was collected in a calibrated reservoir. To avoid loss of gas in solution the aspirator was refilled with this water.

A single unit of this type was inoculated on March 19, 1955, with 4 litres of actively digesting sludge and was kept for 3 months in a room where the temperature was maintained as far as possible at 35° ± 3°C., though temperatures substantially outside these limits were reached for short periods. The period of retention in the digester was kept constant at 43·9 hr., and variations in load were due only to variations in the strength of the waste obtained from the slaughter-house. Fig. 3

Table 2. Average results of treatment of slaughter-house waste waters

	Influent	*Effluent from digester at*		*Effluent from percolating filter*
		35°C.	33°C.	
Biochemical oxygen demand (p.p.m.)	2326	249	80 (60-400)*	8
Permanganate value (p.p.m.) ...	219	37	21	12
Organic carbon (mg./l.)	931	111	65 (50-100)*	10
Ammonia (mg. N/l.)	40	252	250	40
pH value	7·0	7·8	7·8	6·0
Colour	Dark red	Light brown	Straw	Pale straw

*Figures in brackets show range of results obtained.

shows that digestion with production of gas began at once. The degree of purification expressed as percentage removal of organic carbon or of B.O.D. did not vary very much with the strength of the influent, provided that certain limiting values were not exceeded. Figs. 4 and 5 show, however, that the weight of organic carbon and of B.O.D. removed for a given volume of digester increased approximately linearly with the strength of the waste being treated. During the whole experiment the average reduction in B.O.D. was 89·3% and in organic carbon 88·1%; this corresponded to an average removal of 0·45 g. organic carbon per litre of digester volume per day. The average composition of the effluent is given in Table 2.

As the work in New Zealand had shown the importance of temperature and as there are known to be optimum temperatures for the digestion of sewage sludge, further information on this point was sought by operating eight 10-litre digesters at temperatures of 25°, 30°, 33°, 37°, 40°, 45°, 50°, and 55° ±1°C. Close control of temperature was ensured by enclosing each digester in a thermostatically-controlled housing. At first the performance at all temperatures was equally good, but after 6 weeks the digesters at the four higher temperatures had lost most of their sludge and their performance had deteriorated. Fig. 6 and Table 3 show the average results of operation of these digesters during the subsequent 10 weeks, and Fig. 7 shows the range of performance of each; all conditions, except temperature, were the same for all digesters. It will be seen that most stable conditions

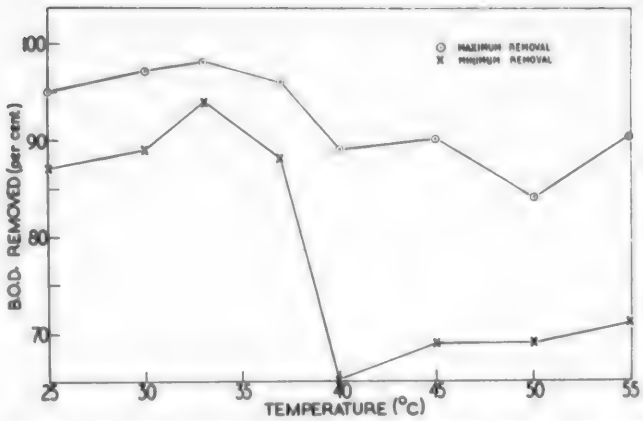

Fig. 7. Range of daily performance of anærobic digesters at different temperatures. All digesters received the same loads.

were achieved at 33°C.—the temperature at which maximum removal of B.O.D. and production of gas also occurred. At this temperature 95·5% removal of B.O.D. was obtained and 98% removal was achieved for short periods. Table 4 shows that little improvement in the quality of the effluent is likely to be obtained by extending the period of retention beyond about 48 hr. Although better results were obtained at 55°C. than at 40°-50°C., operation at the higher temperature was not further investigated because it is not likely to be economic to heat all the effluent from a slaughter-house to this extent.

The variation in performance at different temperatures appeared to be determined by the condition of the sludge. At 33°C. the sludge remained in a granular form, free from gas bubbles, and could be removed by settling; vacuum degasification, found necessary in both the American and New Zealand work, was not required. At less favourable temperatures the sludge became thixotropic, entrapping gas bubbles, and formed a thick inactive layer on the surface of the liquid.

The gas produced contained 81% methane and 15·4% carbon dioxide; the remainder of the gas was not analysed, though traces of hydrogen sulphide were detected. Carbon monoxide was not present.

In choosing a method of treating any form of industrial waste water the possible effect on treatment of temporary closure of the works must be considered. For a period of 5 days the feed to the digester operated at 35°C. was turned off, but stirring and a steady temperature were maintained normally. When liquor was again supplied normal digestion began again at once (Fig. 3), though for the first few hours more sludge than usual was discharged from the digester owing to the development of a light sludge when the digester was underloaded. In later, less carefully controlled, experiments, the digesters have been shut down for periods of up to one month without stirring or heating, and there has been no significant loss in performance on restarting.

To render the effluent suitable for discharge to a river further treatment would be required. Treatment of the effluent from the 33°C. digester in a percolating filter at a rate of 70 gal. per cu. yd. per day produced an effluent with an average B.O.D. of less than 10 p.p.m. (Table 2). The increase in permanganate value was due to oxidation of ammonia to nitrite in the filter.

Table 3. Effect of temperature on the operation of matured digesters Average B.O.D. of influent to all units 1,700 p.p.m.

Temperature (°C.)	*Average retention time (days)*	*Average B.O.D. of effluent (p.p.m.)*	*Reduction in B.O.D. (per cent)*	*Load (gm. B.O.D./litre digester vol./day)*
25	1·5	149	91·1	1·13
30	1·4	104	93·9	1·21
33	1·8	76	95·5	0·95
37	1·4	118	93·1	1·21
40	1·45	372	78·1	1·17
45	1·50	347	79·6	1·13
50	1·45	345	79·8	1·17
55	1·8	216	87·3	0·95

Table 4. Effect of retention time on the anærobic digestion of meat waste at 33°C.
Average B.O.D. of influent, 1,492 p.p.m.

Average retention time (hours)	Average B.O.D. of effluent (p.p.m.)	Reduction in B.O.D. (per cent)	Load (gm. B.O.D./litre digester vol./day)
16·5	101	93·2	2·2
23·5	95	93·6	1·5
46	84	94·4	0·8
70·5	84	94·4	0·5

The laboratory experiments described suggest that anærobic digestion followed where necessary by further ærobic treatment, would be a practicable method for treating meat wastes under British conditions. The scale of the experiments is therefore being extended using a digester with a capacity of 500 gal.

Acknowledgments.—The authors wish to thank the Letchworth Bacon Co. for supplies of waste waters and Mr. K. S. Smithard of the Letchworth Urban District Council for useful discussion and for supplies of sludge. The analyses required were carried out by Mr. E. E. Jones and Mr. G. F. Lowden.

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The story of the crucible, from the days of the Pharaohs to the 18th-century "dutch pots" of Continental origin that were the real forerunners of the modern product, is told in an entertaining "history book" published by The Morgan Crucible Co. Ltd. to commemorate their centenary. From crucibles the book goes on to electric brushes, lighting carbons, and resistors as one hundred years of the company's achievement and progress are unfolded. With a hint of things yet to come, the book ends with a nostalgic epilogue by Morgan's chairman, Mr. Peter Lindsay.

American Dehydration Technique

THE foreword to the first edition (1943) states, "The purpose of this book is an attempt to place before those interested in food dehydration a compilation of the latest practical information dealing with this subject." The second edition,* which incorporates most of the advances made between 1943 and 1954, achieves this object in a worthy manner.

In covering the whole range of food dehydration the author has undertaken a formidable task, and is to be congratulated on preserving so reasonable a balance between different aspects of his subject, and on producing a book which, although highly factual, remains easy to read. Equipment, the dehydration of various foods, plant sanitation, the nutritive value of dehydrated foods, packing and storage, rehydration, and analytical methods are dealt with. The foods discussed include not only the familiar commodities—fruit, vegetables, fish, meat, milk and eggs, but also various miscellaneous products such as ice-cream mixes, yeast, macaroni and molasses.

A book covering so much ground in only 300 pages can obviously give no more than a bare outline of each topic, but these outlines are supplemented by copious references to the detailed literature. The adequacy of the documentation, coupled with the clear layout of the subject matter and a comprehensive index, makes this undoubtedly the most useful reference book at present available in food dehydration.

It is, perhaps, not surprising that in a book originating in the U.S.A., the methods described are almost wholly American, and to a British reader, one of the more interesting aspects is the information it gives about American practice, surprisingly different in many cases from its British counterpart. Some of the information may possibly be misleading. For example, the author describes techniques for dehydrating different vegetables: while it is agreed that the same drying conditions are not ideal for all vegetables, the reviewer suspects that the very wide differences in method advocated for the different vegetables are related to the methods adopted by the various commercial concerns from which the author got his information, rather than to the particular requirements for each vegetable.

The book might have been improved had more use been made of the British work in this field. There are references to some of the work of Tomkins and of Ede and Hales, but that valuable summary of wartime experience and research *Vegetable Dehydration* (H.M.S.O., 1946) is nowhere mentioned, nor is there any awareness of the post-war British work on meat which was published before the book appeared (*e.g.* Sharp, D.S.I.R., *Food Investigation Special Report*, No. 57, 1953, and Rolfe, *Food Trade Review*, 1954, **24**, 12).

Here and there criticisms can be made of generalisations leading to over-simplification and apparent inaccuracies; it is implied (but surely not intended) that metal is not suitable for the construction of cabinet driers (p. 13), and that hop driers are considered suitable in Britain for dehydrating potatoes for human food. At the other end of the book (p. 279) the author ignores the fact that a commercially feasible method of compressing dehydrated cabbage and carrot was developed in Britain during the war, so that in 1944 and 1945 a large proportion of these commodities was produced in block form.

Such faults, however, are few, and it is the reviewer's opinion that this book will for many years remain a valuable asset to those engaged in any branch of food dehydration.

E. G. B. GOODING.

* *Drying and Dehydration of Foods.* By H. W. von Loesecke. 2nd Edn., 1955. New York, Reinhold Publishing Corp., and London, Chapman and Hall. Pp. 300 incl. index. 60s. net.

Encapsulated Vitamin A Powders

By A. J. Charlson and S. G. Wiechers

Encapsulated vitamin A powders have been made by vacuum tray drying of vitamin oil-gelatin emulsions. The products were fairly stable when stored in air and the loss in potency was low when the powders were stored in vacuum. Spray drying, drum drying and the effect of particle size of the products have been studied in relation to quality.

THE fact that vitamin A is extremely sensitive to atmospheric oxidation is well known. Furthermore, ultra-violet light and the presence of mineral salts accelerate the reaction. It is not difficult to appreciate, therefore, why many attempts to fortify animal feeds and human foods with fish liver oil concentrates or synthetic vitamin A have been unsuccessful. In a recent publication, Warden and Davies[1] have shown that gelatin can be used to protect mineral salts from adversely affecting a mixed ration containing cod liver oil, while Holman and Ener[2] have demonstrated that incorporation of unsaturated esters in the form of urea-inclusion compounds rather than as the free ester lessens the oxidative destruction of vitamin A. Green and Webber[3] maintain that concentrated fish liver oils absorbed on maize can be used to fortify feeds since antioxidants present in the maize protect the vitamin A.

An alternative approach to the problem of fortifying foodstuffs with vitamin A is the incorporation of encapsulated vitamin A preparations. Considerable research has been carried out on the production of free-flowing vitamin A powders in which substances such as pectin, gelatin, or a wax, protect the enclosed vitamin from atmospheric oxidation. Thus, Nopco Chemical Co.[4] encapsulate vitamin A in a wax, while Stabilised Vitamins Inc.[5] encapsulate the vitamin in an hydrogenated oil. Stability tests carried out at the Texas Agricultural and Mechanical College[6] have indicated that the vitamin A stands up well when the above products are mixed into poultry and animal feeds. Caldwell[7] has produced free-flowing powders by spray drying emulsions consisting of vitamin A oil, pectin, and a starch hydrolysate. The products are claimed to maintain full potency for 6 months. Mead Johnson and Co.[8] also describe a process whereby emulsions containing vitamin A and various carbohydrates are spray dried. The use of gelatin as an encapsulating substance has, however, probably received the most attention; Taylor,[9] in 1940, produced powders by embedding fish liver oil in gelatin containing a plasticiser such as honey or molasses. In a recent patent issued to Chas. Pfizer and Co.[10] crystalline vitamin A acetate is encapsulated in gelatin containing a plasticiser; this product may have a potency as high as a million international units per gramme (i.u./g.), and it is claimed that the vitamin A is readily assimilated by animals.

The nutritive value of dried skim milk is high, but it could be enhanced by fortification with vitamin A.[11, 12] At the request of the Department of Nutrition in South Africa, the possibilities of incorporating vitamin A in dried skim milk have been investigated. Since Australian workers are investigating spray drying of concentrated skim milk containing vitamin A in a hydrogenated oil,[13] an alternative approach to the subject was made, viz. incorporation of vitamin A, protected by encapsulation with gelatin, into skim milk powder. At an early stage in this investigation a number of encapsulated vitamin A powders, of local manufacture, were tested for stability but were found unsatisfactory. It therefore became necessary to investigate the problem of obtaining stable encapsulated powders. Although high potency products are desirable, deterioration of the product may ensue when the potency exceeds 300,000 i.u./g.[10] For this reason the work has been limited to the preparation and investigation of powders of potencies between 50,000 i.u./g. and 70,000 i.u./g.

Experimental

Vitamin assays were carried out by saponification of the above powders and then measuring the ultra-violet absorption of the non-saponifiable material at 312·5 mμ, 326·5 mμ and 336·5 mμ. The Morton and Stubbs formula was used to obtain corrected $E^{1\%}_{1\,cm.}$ values,[14, 15] potency in international units was obtained by multiplying corrected $E^{1\%}_{1\,cm.}$ values by 1,900. All samples were analysed in triplicate, and the results reported represent the mean of the three assays wherein differences in the extreme values did not exceed 8% of the mean.

Spray dried powders

A quantity (10 g.) of fish liver oil ($E^{1\%}_{1\,cm.}$, 226) containing monoglyceryl stearate (0·1 g.) was added to 2 litres of aqueous solution of gelatin (50 g.) and lactose (20 g.) under vigorous stirring at 60°C. The solution was passed three times through a hand homogeniser and spray dried (inlet air temperature, 22°C.; outlet air temperature, 80°C.) yielding a fine powder of the following characteristics:

Determined potency: $E^{1\%}_{1\,cm.}$, 25·9; calc. potency: $E^{1\%}_{1\,cm.}$, 28·3.

A sample of the encapsulated powder was stored at 45°C. in a dish open to air and examined for vitamin A content over a period of several days. It was

found that under these conditions the material was very unstable (see Table 1). When stored in stoppered glass bottles at 25°C. the material lost 85% of its activity after 10 days.

Table 1

Time of storage Days	% Retention of vitamin A
2	66
5	20
9	16
21	9

Shaking the powder (2 g.) with cyclohexane (100 c.c.) for 1 hr. at 30°C. removed 20% of unencapsulated vitamin oil. The washed powder, now freed from surface vitamin, still lost 85% of its activity after storing in air at 45°C. for 10 days.

Attempts to produce a more stable product by emulsifying the oil under carbon dioxide in the presence of an antioxidant (0·1% of nordihydroguairetic acid, NDGA) proved to be unsuccessful.

Drum dried powders

An aqueous solution of gelatin (200 g./l.) was emulsified with fish liver oil concentrate (30 g.; $E^{1\%}_{1\,cm.}$, 226) containing NDGA (0·03 g.) at 60°C. The mixture was drum dried at a steam pressure of 30 lb./sq. in. yielding a product (thin films) of the following characteristics: (found; determined potency; $E^{1\%}_{1\,cm.}$, 25·8; calc. potency; $E^{1\%}_{1\,cm.}$, 29·6).

Storage tests carried out on the product gave the results shown in Table 2.

Table 2

Storage conditions at 25°C.	Time of storage Days	% Retention of vitamin A
In air	6	30
In vacuo (10^{-5} mm. Hg.)	14	100
In nitrogen (oxygen-free)	14	95

Vacuum dried powders

Gelatin-vitamin oil emulsion prepared as above was dried *in vacuo* (40-50 mm. Hg.) at 55°C. for 20 hr. The emulsion was contained in small porcelain trays filled to a depth of about 0·5 in. The dry product, sample A, was obtained in the form of hard plates, *ca.* 0·5 mm. thick, of the following characteristics:

Determined potency ...	$E^{1\%}_{1\,cm.}$, 31·0
Calculated potency ...	$E^{1\%}_{1\,cm.}$, 34·8
Loss of weight on heating	110°C., 7·6%

Coarse and fine particles obtained by milling sample A exhibited wide differences in vitamin A retention when stored in air at 45°C., namely, 60% retention after 3 months and 10% retention after 1 month, respectively. However, when stored *in vacua* (10^{-5} mm. Hg.) at 45°C. over a period of three months both coarse and fine particles retained between 90 and 95% of the original activity.

Tests were now undertaken to determine the relationship between the particle side of the powders and vitamin A retention when stored in air at 45°C. The results of the tests are shown in Table 3.

Table 3

Size range		% Retention of vitamin A	
Tyler mesh	Particle size microns	1 month	2 months
10-14M	1190-1650	89	83
14-20M	840-1190	87	77
20-28M	590-840	77	68
28-35M	420-590	68	57
Through 60M	< 246	31	—

This work was taken a stage further to investigate the influence of an emulsifier and an antioxidant on the stability of encapsulated powders.

Two samples, B (56,000 i.u./g.) and C (55,500 i.u./g.), were prepared as follows:

Sample B:

Fish liver oil, to give a product of	56,000 i.u./g.
Gelatin	200 g.
Water	1 litre
Monoglyceryl stearate (1%) ...	12 g.

Sample C:

Fish liver oil, to give a product of	55,500 i.u./g.
Gelatin	200 g.
Water	1 litre
Monoglyceryl stearate (1%) ...	12 g.
Citric acid (0·01%)	0·12 g.
Hydroquinone (0·01%)	0·12 g.

The products were crushed and samples (particle size range, 590-840 microns) were stored at 45°C. in air. Data relating to the storage stability of these samples are presented in Table 4.

Table 4

Specimen	Time of storage Days	Activity retained %
A	21	81
	50	71
	90	65
B	25	79
	58	70
C	24	72
	43	67
	93	58

It is seen that in all cases there is an initial sharp drop in activity followed by a slow rate of deterioration. Addition of monoglyceryl stearate and/or the antioxidant reveals no apparent effect on stability.

A similar series of tests were then carried out employing synthetic vitamin A.

Two samples, D (65,000 i.u./g.) and E (68,000 i.u./g.), were prepared as follows:

Sample D:

Synthetic vitamin A, to give a product of	65,000 i.u./g.
Gelatin	200 g.
Water	1 litre

Sample E:

Synthetic vitamin A, to give a product of	68,000 i.u./g.
Gelatin	200 g.
Hydroquinine (0·01%) ...	0·12 g.

The results of storage tests on samples D and E (particle size range, 590-840 microns) at 45°C. in air are shown in Table 5.

Table 5

Specimen	Time of storage Days	Activity retained %
D	23	87
	40	80
	67	69
	90	66
E	21	82
	50	71
	90	65

From the data shown in Tables 4 and 5 it is seen that powders containing natural vitamin A (fish liver oil) or synthetic vitamin A when prepared and stored in the same way behave similarly with regard to stability, although the latter powders have a higher initial potency.

Powder samples C and D (particle size range, 590-840 microns) were subjected to further storage tests under partial vacuum in sealed tubes at 45°C. over 3 months. It was found that sample C retained 91% of its activity, whereas D retained 99%.

The effect of moisture on the storage properties of vitaminised powders was assessed in the following way:

Sample B (particle size range, 590-840 microns) was stored in a desiccator over phosphorous pentoxide for 2 months at room temperature. The material retained 70% of its activity. A second sample of B, kept in a desiccator over water at room temperature, developed mould, and after 2 months the semi-liquid mass remaining proved inactive.

To determine the effect of varying the oil/gelatin ratio on the stability of vitaminised powders on storage, the following tests were carried out:

Sample F (19,500 i.u./g.) was prepared from fish liver oil and gelatin (gelatin/oil ratio, 24 : 1). This powder (particle size range, 590-840 microns) was stored in air at 45°C. On testing after 24 days and 37 days storage the loss in activity was found to be 10% and 30% respectively. Comparison of these results with the data shown in Table 4 reveals that varying the gelatin/oil ratio has little or no influence upon the stability of the final product.

Discussion

It is significant that little loss of activity was incurred during the preparation of the encapsulated powders, while the vitamin content of the spray dried, drum dried and finely crushed vacuum dried powders, rapidly decline on storage in air. From experiments conducted in high vacuum it is apparent that the gelatin used for encapsulation is permeable to air with the resultant oxidation of the enclosed vitamin. An alternative explanation is that molecules of oil diffuse through the gelatin with the consequent loss in activity due to atmospheric oxidation of vitamin A.[9] That the encapsulation in the case of larger particles is more efficient may be explained from specific surface considerations.

Both NDGA and hydroquinone were found to be ineffective as antioxidants. Australian workers[13] have found similar results when working with fortified skim milk powders.

The results of the partial vacuum storage tests are encouraging, since partial vacuum storage of fortified skim milk powders is within the compass of industrial large-scale work.

Fish liver oil concentrates and monoglyceryl stearate were obtained from Messrs. Marine Oil Refiners (Simonstown); a synthetic vitamin A concentrate (1 million i.u./g.) was obtained from Messrs. Hofmann La Roche; gelatin (grade 35) was obtained from Messrs. Davis and Company (Krugersdorp).

The authors wish to thank Mr. J. R. Wilson for carrying out the spray and drum drying, and Dr. H. M. Schwartz for helpful advice on the vitamin A assay method. This paper is published with the permission of the South African Council for Scientific and Industrial Research.

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Illustrations—diagrams, flowsheets and black-and-white glossy photographs—should be sent with the article. If there is doubt of the suitability of a proposed article, it is advisable to send a full synopsis to THE EDITOR, FOOD MANUFACTURE, STRATFORD HOUSE, EDEN STREET, LONDON, N.W.1.

Trace Elements in Foods—4. COPPER

By R. D. A. Polhill, B.Sc., A.R.I.C.*

This is the final article in a series concerning trace elements in which the Government Chemist's Department have recently been interested. The preceding articles have dealt with: lead (May 1956), fluorine (June), and selenium (October).

COPPER occurs naturally in many foods[1] to the extent of a few parts per million. Larger amounts are present in such products as tea, coffee, cocoa, liver, yeast, and crustacea, which may contain up to 50 or 100 p.p.m. of copper. Several hundred p.p.m. have been found in oysters, but this high figure is apparently caused by absorption of copper from contaminated water.

Copper may be introduced into foods in various ways. Copper vessels or pipes may be used during processing. Copper fungicides may be used for spraying fruits or vegetables. The colour of canned peas has sometimes been "improved" by the addition of copper salts.

Copper is an essential element in nutrition, as it is necessary for the production of hæmoglobin. It is prescribed medicinally[2] with iron for treatment of some types of anæmia (dose about 3 mg.).

In large doses of approximately ½ g. soluble copper salts are used as emetics. Smaller amounts may have a general irritant action on the gastro-intestinal tract.

No clear case has been made out for chronic poisoning by copper, but the Food Standards Committee of the Ministry of Food has recommended limits for the copper content of foods. These limits are designed to protect the consumer against the sale of foods containing copper greatly in excess of normal nutritional needs, and are consistent with good commercial practice. Special limits are proposed for certain foods, for example, 30 p.p.m. million for flavourings, 7 p.p.m. for wines, beer and cider, and 2 p.p.m. for other beverages. There is also a general limit of 20 p.p.m. for other foods. An exception is made for certain foods where the copper present in excess of 20 p.p.m. can be shown to be of natural occurrence.

Copper sulphide staining in fish paste.

Quite small amounts of copper may have a deleterious effect on some foods.[1, 4] For instance, the presence of less than 1 p.p.m. of copper in oils and fats has been shown greatly to accelerate the production of oxidative rancidity. A similar effect has been noted in milk and butter. Ascorbic acid is more quickly oxidised in the presence of traces of copper. Discoloration of sour-milk cheese, and the appearance of haze in wines has also been attributed to the presence of a few p.p.m. of copper.

Determination in foods

Copper is often determined colorimetrically as its diethyldithiocarbamate with or without a preliminary separation from interfering ions. Other colour reagents used include dithizone, rubeanic acid, phenanthrolines, diquinolyl, *bis*-cyclohexanone oxalyldihydrazone, and dibenzyldithiocarbamic acid.

Preparation of sample

In most cases it is necessary to destroy organic matter completely by ashing or wet combustion. Exceptions are butter,[5] which may be treated with hot diluted nitric acid and the copper determined in the aqueous layer after removal of fatty matter with petroleum ether, and some liquid foods from which the copper colour complex may be extract directly with an organic solvent.

Ashing at a temperature not above 500°C. in silica dishes may be used for substances with a bulky ash. It is often advisable to treat the ash with a little nitric or sulphuric acid and evaporate to dryness to complete the ashing process and ensure that the copper is easily soluble. (Badly etched silica dishes tend to absorb copper and render it insoluble.) The ash is dissolved in diluted acid.

Wet combustion is usually carried out with nitric and sulphuric acids. Preliminary treatment with nitric acid to remove chloride at a low temperature is advisable as loss of copper in the presence of chloride has been reported. After addition of sulphuric acid, combustion is completed by addition of small amounts of nitric acid as the mixture reaches the charring point. The residual sulphuric acid is boiled down with water to remove oxides of nitrogen and, after dilution, any insoluble matter is treated with diluted hydrochloric acid to dissolve absorbed copper.

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Other methods of destruction of organic matter have been reviewed by Middleton and Stuckey.[6]

Isolation of copper

With some colour reagents no separation from interfering ions is necessary. However, several processes have been used for the separation of copper from iron and phosphates:

(a) Electrolysis. This is carried out on the diluted acid solution of the prepared sample with platinum electrodes. If much nitric acid is present a more reliable result is obtained by the addition of urea to prevent interference from nitrous acid formed during electrolysis. Large amounts of copper may be weighed directly on the cathode. Smaller amounts are dissolved from it and determined colorimetrically. Tin and other metals are deposited with the copper.

(b) Precipitation as Sulphide. This has been used in the Society of Public Analysts method for Copper in Food Colouring matter,[7] and is also used in the Association of Official Agricultural Chemists[8] method for amounts of copper greater than 1 mg. In the S.P.A. method, after removal of lead by the sulphate precipitation, copper is precipitated by hydrogen sulphide at *p*H 4. In the A.O.A.C.[8] method sodium thiosulphate is added to an acid solution of the prepared sample. The sulphide precipitate is filtered off and dissolved in nitric acid. Large amounts of iron are removed by precipitation with ammonia, and the copper then determined colorimetrically as diethyldithiocarbamate in the S.P.A. method, and by titration with thiosulphate after reaction with iodide in the A.O.A.C. method.

(c) Dithizone Separation. Copper may be extracted from acid solution by solutions of dithizone in chloroform or carbon tetrachloride. Wichmann recommends extraction at *p*H 4-5 when the copper is easily extracted, but is accompanied by bismuth and some other metals. Most of these may be removed by shaking the extract with dilute hydrochloric acid. Extraction with dithizone from acid solutions containing iodides removes only copper and this method is used by the A.O.A.C.,[8] extraction being carried out with dithizone in carbon tetrachloride (25 mg./litre) from aqueous solution *p*H 3-3·3.

Extraction from a more strongly acid solution is recommended by Monier-Williams,[1] who uses a 0·1% solution of dithizone in chloroform. Several extractions are necessary as copper is only slowly extracted at low *p*H.

Colour reagents

(a) Diethyldithiocarbamic Acid.[9, 10] Copper reacts with water-soluble diethyl dithiocarbamates in neutral or alkaline solution to form a yellow-brown colloidal solution of the copper salt. The solution may be stabilised by the addition of a protective colloid such as gum arabic. Precipitation of alkaline earth phosphates may be prevented by the addition of citrates, which also prevent interference from small amounts of iron. Pyrophosphate has also been used to prevent interference from iron. The colours produced may be matched against standards similarly prepared, or their intensity measured in a suitable comparator with a standard disc.

Copper diethyldithiocarbamate is soluble in organic solvents such as amyl alcohols, chloroform, or carbon tetrachloride, and may be extracted with these after formation in aqueous solution. Carbon tetrachloride is often used for this purpose, extraction with successive small quantities being necessary to remove all the copper. As the carbon tetrachloride extract of the copper complex is rapidly bleached by exposure to strong light,[21] the extraction should be carried out in weak daylight or artificial light. The extracts are combined and made up to a definite volume, and the colour measured with a comparator, or the optical density measured in a suitable instrument (maximum extinction of the copper colour is at about 435 mμ).

Apart from iron, the presence of nickel, cobalt and bismuth also causes interference with both aqueous and solvent extracted colours. These metals may be removed by a preliminary isolation step with dithizone. Interference from bismuth may also be eliminated by extracting the carbamate colour from two aliquots of the copper solution, one of which contains cyanide. Copper is not extracted from the cyanide solution, whereas bismuth is. Thus the amount of copper present may be obtained from the difference between the two colours produced.

A modification of the above method introduced by Cheng and Bray is to extract the copper diethyldithiocarbamate from a solution buffered with citrate, in the range *p*H 7-10, and containing *Versene* (the di-sodium salt of ethylene diamine tetra-acetic acid). Under these conditions there is no interference from 1 mg. quantities of iron, nickel, cobalt or manganese, but the intereference from bismuth is not eliminated.

Diethyldithiocarbamic acid is rapidly decomposed in acid solution, but the use of a chloroform solution of the diethylammonium salt[12] allows copper to be quantitatively extracted from acid solution. This process has been used to separate copper from a number of other metals.

(b) Dibenzyl Dithiocarbamic Acid. This reagent is quite stable in acid solution, and its copper salt may be extracted with carbon tetrachloride from comparatively concentrated acid solutions. This reagent was first described by Marten and Githens, who used a solution of the zinc salt in carbon tetrachloride to extract copper from 5% sulphuric acid solutions. Under such conditions there is no interference from phosphates and iron, and little interference from cobalt or nickel. Bismuth, if present, must be separated from copper by extraction of the copper from fairly concentrated hydrochloric acid solution.

This method was adapted by Stone, Ettinger, and Gantz[13] for the determination of copper in beers, etc., after a preliminary

mild acid treatment. This reagent was also adapted by Abbott and Polhill[14] at the Government Laboratory for the determination of copper in oils and fats. They described the preparation of the acid and its zinc, potassium, and dibenzylammonium salts and the conditions of use of each of them. After preliminary volatilisation of the bulk of the fatty matter by controlled heating the remainder is destroyed by wet oxidation with nitric and sulphuric acids and copper is extracted from the diluted acid residue.

(c) Dithizone.[15] This reagent is mainly used for the separation of copper from interfering ions as described above, but may also be used for the final determination of copper. A dilute solution of dithizone in carbon tetrachloride is used to extract copper from weakly acid solution, the excess of dithizone in the solvent layer being removed by shaking with dilute alkali. Solutions of ammonia and sodium pyrophosphate have been recommended for this purpose. The optical density of the purple-coloured extract is measured at 520 mμ.

(d) Rubeanic Acid. This reagent reacts with copper in slightly acid or neutral solutions to give a grey green colloidal solution. The colour is not extractable with organic solvents, the colours produced being matched against standards or evaluated in a comparator. This method is used for determinations of copper in water and is relatively free from interference from other ions except iron. An improved method using malonic acid to prevent interference from iron has been described.[16]

(e) *Bis*-cyclohexanone Oxalyldihydrazone.[17] This reagent, introduced by Nilsson, reacts with copper in aqueous solution, *p*H 7-10, to form a blue colour which is not extractable with organic solvents. Citrates are used to prevent precipitation of insoluble phosphates. This reagent is suitable for the determination of 0-100 micrograms of copper in 25 ml. of solution and is unaffected by 100 micrograms of other ions, although larger quantities of iron, nickel, cobalt and chromium give rise to extraneous colours. The colours given by this reagent are more suitable for visual matching than the carbamate colours, and a method using this property was developed for a determination of copper in milk products by Sexton[18] at the Government Laboratory.

(f) Phenanthrolines. 2:9 Dimethyl 1:10 phenanthroline (neocuproine)[19] has been described by McCurdy and Smith. It reacts with copper in aqueous solution *p*H 3-10 (optimum range *p*H 5-6), to give an orange colour, hydroxylamine being used to reduce the copper to the cuprous state. The colour may be extracted with amyl, *iso*-amyl, or hexyl alcohols, several extractions being necessary for complete removal. The reagent is specific for copper under the conditions described, but is less sensitive than the carbamate reagents. The optical density of the colours is measured at 450 mμ.

(g) Diquinoline[20] (cuproine). This reagent also reacts in aqueous solution with the cuprous ion obtained by reduction with hydroxylamine. The optimum *p*H range is *p*H 4-5 and the colour produced is purple-red with a maximum optical density at 540 mμ. The colour is stable in aqueous alcoholic solutions or may be extracted from aqueous solution with successive portions of *iso*-amyl alcohol.

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Metallic Food Poisoning

THE contamination of food by copper has long been recognised as a cause of illness. In certain foods, particularly acid fruits, it appears to dissolve more readily than other metals. The toxic hazards introduced by the use of untinned copper utensils in the preparation and cooking of foods should by now be widely known. Notwithstanding, however, the warnings and advice which have been given to the public from time to time regarding the use and upkeep of tinned copper vessels, outbreaks of poisoning by this metal still continue to be recorded.

Skone (*Medical Officer*, 1956, **95**, 23), describes an outbreak of diarrhœa and vomiting following the consumption of a meal consisting of boiled beef, carrots and potatoes, apple tart and custard, prepared in a school canteen at West Bromwich and served to the occupants in three schools. All the food was prepared on the same day as it was eaten. Sixty persons were affected and also three members of the kitchen staff. The incubation period was approximately eight to fifteen hours and the main symptoms were diarrhœa and abdominal pain. Some of the patients, however, also complained of nausea and vomiting, but none were seriously ill. Specimens of fæces from the patients and samples of the meal were submitted to bacteriological examination with negative results. Nose and throat

swabs taken from the kitchen staff were also negative. No chemical analysis was made.

The steam jacketed boiler used in the canteen for the preparation of the food was examined and it was found that the base plate and sides of the boiler were "bare of tin" and there was flaking of metal on the surface of the base plate.

The conditions under which the beef was prepared were recreated and afterwards portions of the cooked meat and gravy submitted for chemical analysis. The results showed that there was a varying degree of contamination with copper in different parts of the meat, ranging from 28·70 parts per million to 80·80 p.p.m. and in the gravy 1·10 p.p.m. The meals centre was visited and it was found that a similar method of preparation of the food had been employed.

The milk used in making the custard had been boiled in a double-panned water-jacketed porringer, and it was noticed that the tinned copper lining was well worn. A sample of the boiled milk showed that it was contaminated with copper to the extent of 4 p.p.m.

The above outbreak goes to show that it is essential for all tinned copper utensils used for the preparation of food and drink to be periodically examined and that retinning should take place at frequent intervals.

The Purchasing Officers Association has published a booklet, *Economic Indices*, describing the basis of compilation and the commodity content of the price indicators which are issued regularly by various authorities and which are widely used in assessing the price trends of materials and products in many branches of industry. The indices covered are the privately compiled *Reuter's*, *Moody's*, *Financial Times*, and *Economist* series, as well as the Board of Trade figures relating to specific industries.

The essential features of the booklet are the listings of the commodities on which each index is based and the relative importance, by value, of each. Copies are obtainable from the Association, Wardrobe Court, 146a, Queen Victoria Street, London, E.C.4, price 1s. 6d., post free.

Rose's Halve Labour, Raise Productivity 50%

BY reorganising their St. Albans, Herts, factory, a 250% rise in operator output over 18 months was achieved in the fruit juice and marmalade departments of L. Rose and Co. Ltd. Production labour force was halved, and there was a 35% overall gain in productivity which has since risen to about 50%.

According to the British Productivity Council's publication *Target*, reorganisation started in the marmalade boiling and filling rooms. Previously each man had been allocated one job; the boiling pans were located at the wall farthest from the filling room, and the marmalade had to be man-handled across other lines of work. The number of boiling pans was halved and they were re-sited on either side of a 3 ft. high platform with easy access to the filling room. A tipping bogey mounted on rails running the length of the platform was provided to serve the pans. The boiling room was replanned so that pulping, shredding, juice mixing and the preliminary boiling operations could be laid out in sequence on either side of a central gangway and arranged so that the minimum distance had to be travelled between processes. The speed of the pulping machines was increased and the method of juice extraction improved, increasing the yield by 25%. Machines were mounted on platforms to provide gravity flow.

Wastage was avoided by a materials control system based on plant efficiency, strict observance of process formulæ and exact tare weights for containers. With these changes and the application of an incentive scheme, the number of boilings per day increased by 80%.

On the marmalade filling line a steam pre-heater for jars was replaced by a simpler floor heating system, and a more efficient capping machine was installed. These and other changes resulted in 50% more throughout with half the original labour force of 22.

In the fruit drinks department one of the two filling teams was eliminated and a single team was used to operate both filling lines in turn. The result was a much higher level of output than that achieved previously with two teams. The two filling conveyors were shortened from 40 ft. to 25 ft., the extra space being used for packing and storage. Rotary capping and labelling machines were raised to allow operators to take bottles from the conveyor and feed the machines in a balanced two-hand cycle. While one line is in use the second can be set up for a run on another product. Previously, changing over caused an average loss of ½ hr. a day.

The two main filling lines deal only with long runs, small batch work being dealt with by a spare team of six operators, trained to cope with a variety of jobs.

All man-handling has been eliminated in the mixing and sugar syrup boiling room and three men do the previous work of six.

Break times were staggered for all departments and duties were arranged so that one operator on each preparatory section started ½ hr. earlier so that the filling lines could start up on time.

A bonus scheme, based on job rating, was applied on an individual and group basis, points being awarded for responsibility, skill, working conditions, effort and training.

Food From Sewage

THE possibility of using sewage as a food source was discussed by Mr. Peter C. G. Isaac, senior lecturer in public health engineering at Durham University, in the *Municipal Journal* recently. He proposed that the green scum of algæ at the outlets to oxidation ponds or lagoons should be grown directly in the sewage as a valuable source of proteins and vitamins. This would have the additional advantage of supplying oxygen to the bacteria. The putrescible organic matter in the sewage could then be broken down in the presence of oxygen to simple mineral substances such as ammonia, sulphate and phosphate.

Advances in Food Technology

BUTTER

Improved Packaging

In recent years, the methods of butter packaging have been considerably improved. It has been confirmed by numerous investigations on the consistency, structure and water distribution of butter, that the best method of producing butter of high keeping quality is shaping immediately after kneading. To obtain the best distribution of water in the butter and to obviate bacterial decomposition, it is advisable to use "butter mixers." New continuous methods of butter packaging have been developed where the butter is pressed or pumped direct from a continuously working butter making machine into an automatic butter packaging machine. Further research is being carried out to improve the hygienic and economic conditions of automatic butter packaging. — J. Kalkschmidt, *Fette, Seifen, Anstrichmittel*, 1956, **58**, 632.

FRUIT JUICE

Turbid Products

Since the war an increasing preference has been shown for turbid fruit juices containing a mixture of the original fruit pulp. Such "liquid fruit" has been found at once more tasty, more nourishing and easier to digest. The production of turbid fruit juice calls for special manufacturing techniques. In Italy, the ordinary preparation of the juice is followed first by corrections of the pectic contents and vitamin C contents (preferably by adding an ester of provitamin C which is later converted to ascorbic acid during the pasteurisation), and then by a centrifuge treatment by means of which the degree of turbidity is regulated. Then follow the homogenisation - atomisation vacuum processes which are indispensable for this type of fruit juice, and pasteurisation by means of a special lamp which has the effect of slowing down enzyme action, sterilising the microbes and ensuring the stability of the pulp and non-fermentation. It is not advisable to use these types of fruit juices in the form of concentrates, except in the case of orange juice and tomato juice.—A. Bertuzzi, *La Revue de la Conserve*, 1956, **11**, No. 6, 27.

MILK

Protection from Sunlight

The effectiveness of amber glass and waxed paper carton in protecting milk from sunlight has been compared by the C.S.I.R.O. in Melbourne.

It was found that amber glass bottles were superior to waxed paper containers, and these in turn to glass bottles, in protecting milk from sunlight flavour. Milk exposed to sunshine in amber glass bottles, however, showed a marked temperature rise due to the greater heat-absorbing capacity of this type of glass. Waxed-paper cartons were found to have the best heat-insulating properties.—E. G. Pont, *Aust. Jnl. Dairy Technology*, April-June 1956.

CHOCOLATE

Tests of Hermetic Packing

The laboratory of the Lindt and Sprüngli chocolate factory at Kilchberg is using a simple underwater vacuum apparatus to test samples of heat-sealed moisture-proof packings of chocolate for water-tightness and resistance of the sealing seams. By simple statistical calculation it is possible to ascertain the percentage of defective packings produced by a heat-sealing machine. But defective packings are not necessarily due to the machine; they may also be due to faulty packing materials. —J. Kleinert, *Gordian*, 1956, **56** (1338), 32.

CURED MEAT

Colour Fixed by Na Ascorbate

Simultaneous injection of two brine solutions, one containing sodium ascorbate or ascorbic acid, and the other sodium nitrite, is an effective method for introducing the two chemicals into ham. The value of using ascorbic acid and sodium ascorbate in the curing process was substantiated.

Cured meat colour was determined for individual ham muscles and reported in terms of Munsell Notation for hue, value and chroma.

Hams cured in a brine containing ascorbic acid were found to have a deeper red colour than the controls.

The colour of the cured centre ham slice did not fade as rapidly during the 5-day display storage period as that of the regular cured ham. Sodium ascorbate was equally as effective in obtaining the desired initial colour, but fading was slightly more rapid during display storage. Hams cured in brine containing both ascorbic acid and sodium hexametaphosphate were found to have a red colour equal to those hams cured in brine containing only the ascorbic acid.

The *longissimus dorsi* cured in brine, containing sodium ascorbate plus sodium hexametaphosphate, had a more desirable colour than muscle cured in brine containing sodium ascorbate plus sodium tripolyphosphate.

Pork muscle cured in brine containing monosodium glutamate in conjunction with sodium ascorbate was found to have a light grey-pink colour which was considered to be more characteristic of cured ham than those samples cured with either ascorbic acid or sodium ascorbate.—R. L. Henrickson, *et al.*, *Food Tech.*, 1956, **10**, 10, 500.

FISHERIES

Effects of Radioactivity

A long-range international research programme on the physics, chemistry and geology of the sea and on the biology of marine organisms is an urgent necessity if atomic science is to progress safely, according to the Committee on the Effects of Atomic Radiation on Oceanography and Fisheries, set up by the U.S. National Academy of Sciences.

Tests of atomic weapons can be carried out over or in the sea in selected localities without serious loss to fisheries if the planning and execution of the tests is based on sufficient knowledge of the biological regime, say the committee, and this also applies to the experimental introduction of fission products into the sea for scientific and engineering purposes. The committee recommend that in future weapons tests: (1) in the planning stage committees of disinterested scientists should be consulted and their recommendations followed, (2) funds should be made available for scientific studies unrelated to the character of the weapons themselves, and (3) the recommended scientific programme should be supported and carried out independently of the military programme rather than on a "not to interfere" basis. They add that within the forseeable future the problem of atomic waste disposal from nuclear fission power plants will greatly overshadow that of the dispersal of radioactivity from weapons tests. It is estimated that within 50 years nuclear fission will be producing about half as much power annually as the people of the world are using today from all sources. Accumulations year after year will eventually result in a constant quantity of radioactivity, at which point the waste radioisotopes will equal between 1 and 2 times the total natural radioactivity in the world oceans, roughly 1,000 times the amount produced so far in weapons tests. They urge, therefore, that cognizant international agencies formulate as soon as possible conventions for the safe disposal of atomic wastes at sea based on existing scientific knowledge, and they warn that because of the increasing radioactive contamination of the sea and the atmosphere, many of the necessary experiments will not be possible after another 10 or 20 years. The broader problems concerned with the full utilisation of the food and other resources of the sea also require intensive collaboration in the scientific use of radioactive material.—*Science*, 1956, **124** (3210), 13.

MEAT

Quality of Pre-Wrapped Frozen Cuts

Trials have been carried out at the C.S.I.R.O. Meat Investigations Laboratory, Brisbane, to compare pre-wrapped frozen cuts with bulk-frozen meat under comparable storage conditions and to compare certain techniques, with special attention to appearance of both frozen cuts and thawed-out material, weight and drip losses, and eating quality of the product. The trial was made with grilled rump steaks and rolled sirloin roasts.

The trial showed that, as far as eating quality is concerned, frozen packaged cuts rate at least as high as cuts prepared from bulk-frozen meat, provided the wrap is sufficiently impermeable to water vapour to restrict evaporation during freezing and storage. The ultimate place of pre-packaged frozen cuts in the storage and transport of meat must, therefore, depend largely on handling costs and sales appeal.

With grills, the freezing rate was high enough to reduce the amount of drip, but with roasts centre temperatures did not reach the freezing point for about 2½ hr., and there was no apparent effect on drip. Considering the possibility of using high rates of freezing, apart from the question of packaging as such, in many cases this will be determined as much by economic considerations as by the desirability of reducing drip.

Under the conditions of freezing and storage employed in the trial there was pronounced freezer burn with unwrapped material and slight burn with wax-paper wraps. Weight losses due to evaporation were negligible with the two plastic materials used, namely polyethylene and shrinkable polyvinyl-vinylidine chloride. Overall losses were less for the wrapped prepared grills compared with meat frozen and stored in bulk, and there was some evidence that the same applies to roasts.

Eating quality was little affected by the method of wrapping other than that the unwrapped grills were dark and dry when cooked and were less acceptable than the other samples. With roasts the bulk-frozen material was very slightly tougher and weaker in flavour.—P. E. Bouton and A. Howard, *Food Preserv. Quart.*, 1956, **16**, 3, 50.

DEHYDROFREEZING

Apricot Preparation

A process has been developed for the production of dehydrofrozen apricots of bright colour and rich flavour. It involves a two-step SO_2 treatment, followed by drying on trays to 50% weight reduction. The second step of the sulphite treatment has been adapted to a continuous spray application and the process has been tested on a commercial basis. Formulæ have developed for the use of dehydrofrozen apricots in the preparation of pies and preserves. The following formula for pies has produced a satisfactory product:

Dehydrofrozen apricots, of 50% weight reduction	20 oz. (320 g.)
Water	30 oz. (480 g.)
Sugar	9 oz. (144 g.)
Cornstarch	1·5 oz. (24 g.)

Mix a small amount of water with cornstarch to make a slurry. Heat remaining water to boiling. Stir in sugar and starch slurry. Combine the thawed apricots with the boiling syrup and boil for 1 min. Cool mixture and place in 9½-in. pie shell. Bake.

Dehydrofrozen apricots are not included in the Federal Standards of Identity for preserves established by the U.S. Food and Drugs Administration.—M. J. Powers, *et al.*, *Food Tech.*, 1956, **10**, 10, 489.

Machinery and Equipment

ELECTRIC OVEN

The HO.12 single oven unit is the latest addition to the range of G.E.C. catering equipment. It has a roasting oven with hob mounted above it and is designed to cook for about forty people. The range is so designed that multiples can be mounted side by side, or back to back, and built up to make multi-oven units to meet individual requirements.

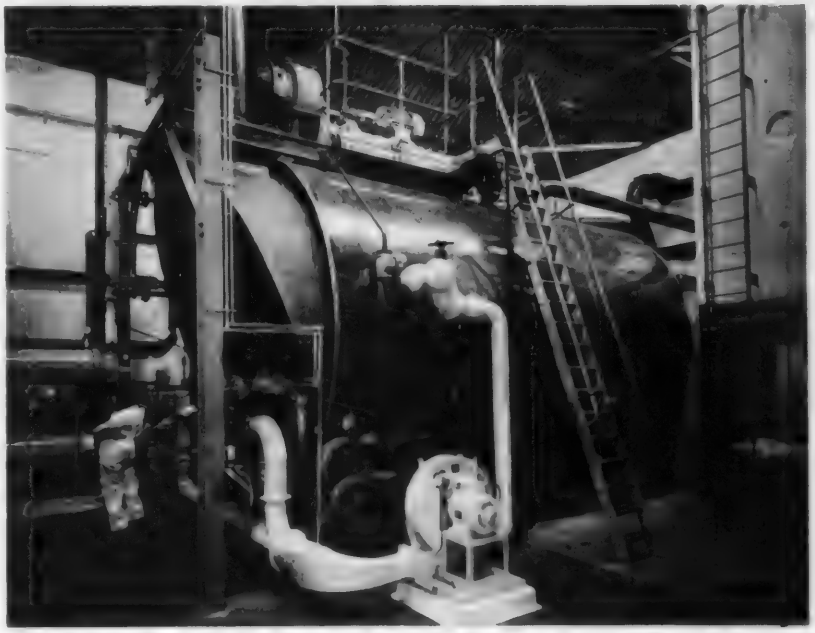
The oven is thermostatically controlled, ensuring that just sufficient current for cooking is used. Control of the hot plates is by three-heat rotary switches mounted on a recessed panel, which can be swung forward to give easy access to the fuses and pilot lights. The oven is 16½ in. wide × 22 in. high × 18 in. deep, giving a total capacity of 3¾ cu. ft.

THERMAL STORAGE BOILER

It is claimed that a new type of boiler, developed by Edwin Danks and Co. (Oldbury), Ltd., based upon patents held by Dr. E. G. Ritchie, results in fuel economy and higher factory output. The first of these boilers was installed at the works of Quaker Oats Ltd., Southall, in September, 1955. According to Dr. Ritchie, it is the first major advance in boiler design for 25 years.

The new boiler combines the functions of steam raising and heat accumulation so that its water volume acts as a thermal flywheel, storing heat by controlled rise in water level during periods of low steam demand and releasing this heat by controlled drop in water level to meet the peaks. In order to provide substantial storage effect the shell of a thermal storage boiler is enlarged in diameter to allow a rise and fall of 2 to 3 ft. in the water level, control of the rate of flow of feed water to the boiler being effected by a regulator impulsed by steam pressure. In this way peaks 25% to 40% above the average and valleys down to 50% of the average or lower can be met for considerable periods of time at constant steam pressure and without change in the firing rate.

In the case of the boiler installed at Quaker Oats Ltd., the average steam demand on a heavy day was estimated to be between 11,000 and 12,000 lb./hr. actual, with peaks touching 15,000 lb./hr. during the day. The estimated load level during the night was expected to be somewhat lower. To meet these conditions it was decided to instal an oil-fired thermal storage boiler



Thermal storage boiler (peak capacity 20,000 lb. steam/hr. at 250 p.s.i. working pressure) at the Quaker Oats factory, Southall, Middlesex. It is said to be the first major advance in boiler design in a quarter-century.

11 ft. 6 in. dia. × 17 ft. long, the heating surface, draught plant, chimney etc., being designed to suit the above average steam demand. This enabled provision to be made for a rise and fall of water level of 2 ft. 3 in., giving a storage capacity of 20,400 lb. of water. The boiler was designed for a working pressure of 250 p.s.i., steam being supplied to the factory at 150 p.s.i., through a reducing valve, the rate of flow of water to the boiler being controlled by the feed water regulator.

An important feature of the thermal storage boiler is the water level gauge which acts as a master firing gauge. It is graduated and marked to inform the fireman exactly when to reduce his rate of firing as the water level approaches the top limit and when to increase his rate of firing as the water level approaches the bottom limit. This can be done slowly, without sacrificing efficiency, and no alteration to the feed water regulator or adjustment of the feed check valve is required. If the fireman fails to take action at the proper time, the high or low water level over-controls come into operation. Should these fail, audible alarms are sounded. As long as the water level remains in the sector marked "constant" no adjustment of the burners is necessary, thus leaving plenty of time for fan and damper adjustment for maximum fuel efficiency.

So far, steam release by pressure drop has not been necessary under normal conditions, although it has proved extremely useful on occasion to cover boilerhouse incidents such as temporary stoppage of make-up water and electrical failure, but in no case has the emergency been transmitted to the factory.

POUCH MAKER

R. W. Barraclough Ltd., have concluded an agreement with the Bartelt Engineering Co., of Rockford, U.S.A., for the manufacture, sale and servicing of their flexible pouch making and sealing machine for the U.K. and British Commonwealth markets (excluding Canada).

The machine produces flexible pouch packs from the reel in heat-sealing papers, foils, films, laminates, etc., at speeds up to 100 pouches per min.

Special filling equipment for count or volume feed is available for handling a multiplicity of products, including free-flowing powders, hardware details, soft drinks, high viscosity compounds, syrups, etc.

ICE-CREAM MACHINE

A machine for the instant refrigeration of ice-cream and cold beverages was shown at the 6th International Salon of Technics in Turin recently. It is said that drinks and ice-cream, ready to be served in portions can be prepared in 4 to 6 sec. This process eliminates the need for preservatives and the handling of materials during processing. It is also claimed that the speed of the operation means that the full flavour and vitamin content of ingredients such as fruit juices, milk, honey and wines is retained, and makes it unnecessary to add binding agents, like pectin or isinglass.

An average size machine produces about 20 kg. of ice-cream per hr. and does not require a skilled operator. Production can be stopped and resumed at will.

AIR FILTER

The *Amer-glas* air filter, manufactured by the American Air Filter Co., is now available in England. Air Control Installations Ltd. hold exclusive selling rights in the U.K.

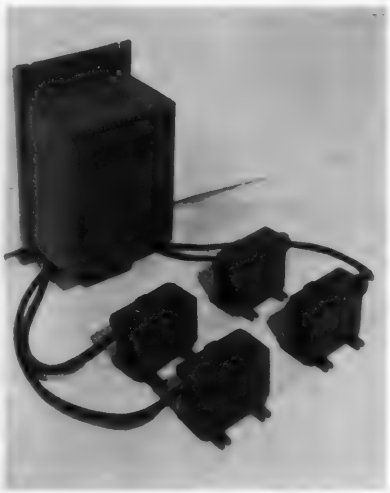
The material is a replaceable unit air filter for general use in industrial and commercial air conditioning, ventilating, and heating. Its special construction ensures progressive density from front to back of the pad, enabling the filter to trap dust and dirt throughout its thickness, reducing heavy dust deposits on the air-entering side. It is composed of resilient, continuous, inter-laced glass filaments bonded with thermo-plastic.

The manufacturers say that this material will not break or tear like ordinary glass fibre materials, and that each sq. ft. of material, approx. 2 in. thick, contains 37,000 linear ft. of glass fibre to collect and retain the dust particles.

PHOTOCELL LEVEL CONTROLS

Airmec's new photocell equipment offers an accurate means of controlling the level of liquids, powders and small articles, stored in reservoirs, hoppers or similar containers. The arrangement of two light beams, which are both broken at the higher level and are both continuous at the lower level, means that there does not have to be any contact with the material entering the storage unit. Even highly corrosive liquids, therefore, or materials at very high temperatures can be controlled as easily as more conventional materials such as oil, flour and sweets. Also the use of float or pressure type switches, which are likely to wear, is eliminated.

The machine is operated by mounting the light source units, with the beams horizontal at the upper and lower limits required, on one side of the container, and the photocell unit, mounted in line with each beam, on the opposite side. To allow the free



Airmec's photocell equipment for controlling the level of articles in storage containers.

passage of the light beam the containers are usually fitted with small glass or mica windows. An auxiliary unit, which houses the controlling relay for the filling mechanism and supplies the power for the light source unit, is mounted nearby.

When the level of the material in the unit drops below the lower limit, both beams will be uninterrupted, the control relay will operate and the filling mechanism will be started. As the filling continues, first the lower beam and finally the upper beam will be broken by the rising level of the incoming material. Once both beams are broken, the control relay will release and stop the filling mechanism. Where desired, an indicator lamp can be fitted to show when filling is taking place.

One advantage of this machine is that of complete flexibility, since, being almost independent of the physical and completely independent of the electrical properties of the matter which it controls, there is no need for readjustments or switch changes for changed loads. In case of dirt on the windows, which would simulate a broken beam, or of the failure of one or both bulbs in the light source unit, the equipment is designed to switch off automatically and thus prevent the reservoir from overfilling.

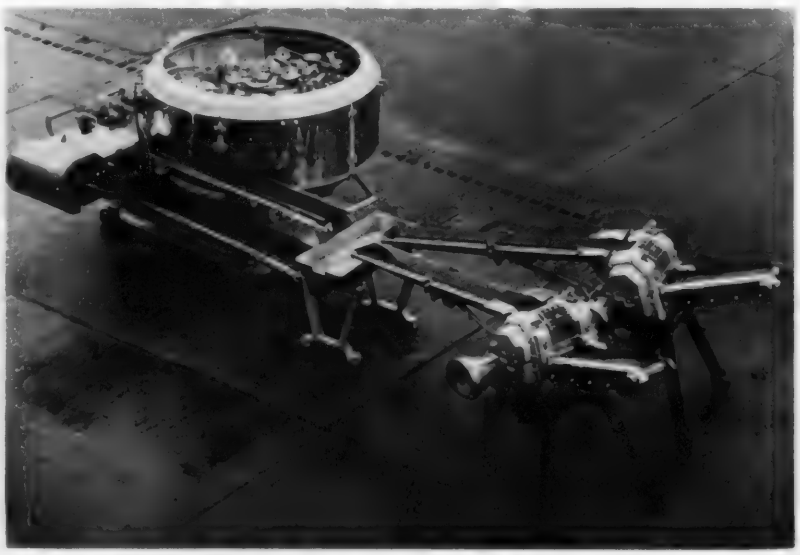
The equipment can also be used for coincidence control, or in conjunction with other Airmec units for high and low speed counting, batch counting or smoke alarms.

FILLETING UNIT

A white fish filleting unit for processing small haddock, cod and fish with similar bone structure has been introduced by Nordischer Maschinenbau Rudolf Baader. The fish must range in size from 1 ft. to just under 2 ft.

The unit measures each fish automatically, deheads, fillets and cuts the (nape) belly flap all in one closed operating cycle. It handles gutted as well as ungutted fish and the size of the nape to be cut off is adjustable.

The unit consists of a combination heading-filleting-nape-cutting machine —the Baader 38—and two skinning machines—the Baader 45. Four operators are required to work the machines —one feeder for the filleting machine, one operator for each of the skinning machines and one trimmer. The speed of the unit can be adjusted but the average output is 2,100 fish per hr. It is claimed that the machine gives a yield of fish of 40% which is 2% higher than hand labour and that it produces at the rate of 1,920 lb. of skinned fillets per hr., compared with 1,824 lb. by hand labour.



The "Baader 38" white fish filleting machine.

Part of Alfa Laval's engineering testing laboratory at Brentford.

ELECTRICAL WEIGHING AND MEASURING

At a one-day conference held at the works of Thomas Robinson and Son Ltd., Rochdale, two aspects of the application of the latest electrical techniques to food and other processing plants were discussed.

First Mr. W. G. Bond an executive of Elliott Brothers, talked on the measurement of the temperature of grain in silo bins. He explained that a new measuring system, using nylon protected thermocouple cables, with high speed potentiometric temperature indicators is now available. The advantages of this new system are:

1. An increased number of temperature sensing points per bin—up to a maximum of 18 at 5 ft. intervals.
2. A reduction in the overall cable diameter to less than 0·45 in. (made possible by the use of the thermocouples as the temperature sensing medium) eliminates the necessity for strengthening bin tops to withstand the pull of the measuring cables during loading and settling of the grain. The cable incorporates a steel strain wire with a breaking point of 6,200 lb. which together with the thermocouples is contained and completely sealed in a tough nylon outer covering.
3. No voltage stabilisation equipment is necessary, the thermocouples generating an electrical input to the central instrument panel directly as a result of bin temperature changes.
4. Multiple readings on a central instrument panel considerable distances away from silos using a new digital form of presentation with automatic monitoring of bin temperatures. The use of visible and audible alarms to warn plant operators of any rise in temperature in any bin.
5. On large installations cost is considerably less than the equivalent resistance thermometer system.

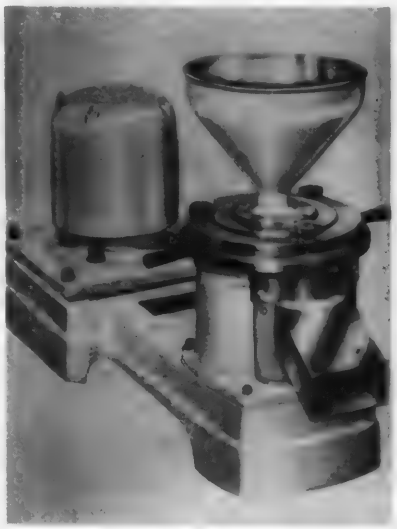
The second half of the meeting dealt with electrical weighing under the guidance of Mr. K. Railer of Elliott Brothers.

In many industrial processes control by weight is required and for many years this has been accomplished by mechanical scales and balances. Only recently has the measurement and control of weight become possible by electrical methods.

The weight measuring element, a capsule, is called a load cell which, in essence, is a steel billet which is deformed when loaded. Attached to the billet by means of a perfect bond are several wire strain gauges, connected together as a Wheatstone Bridge circuit. A polarising voltage is applied to the bridge circuit and an output signal is derived according to the load on the billet. The billet is housed within a hermetically sealed case.

The electric method of weighing has the following advantages:

1. There are no moving parts.
2. There are no levers, bell cranks or knife edges.
3. The measuring capsule, being hermetically sealed, is free from interference from dust and dirt.
4. The output signal being electrical, remote or nearby indication, recording and control facilities, can be provided.



Multi-purpose mill.

PROCESS LABORATORIES

Extensive process laboratories have recently been opened by Alfa-Laval Co., Ltd., at their premises on the Great West Road, Brentford. These were erected to meet the increasing demand for experimental work in the application of De Laval equipment, including centrifugal separators, pumps, heat exchangers, filters, etc. in the chemical, engineering and process industries. The building includes process, engineering and chemical laboratories, photographic section, library and technical offices.

The process laboratory includes a range of pilot scale centrifugal separators which are primarily intended for the processing of customers' samples. These machines are exact replicas of the full scale commercial centrifuges and hence results obtained from samples of 1 or 2 gal. of material can be translated to full scale industrial operation. Several hundred samples are treated annually in the Brentford laboratories alone. This service is offered free to customers.

There is also an engineering laboratory for larger scale development, particularly on new equipment, including washing equipment for machine parts, oil purifying equipment for turbine, diesel and transformer oils, plate heat exchangers for all heat transfer problems as well as stainless steel pumps, oil filters, etc.

HEAVY VESSEL FACTORY

Robert Jenkins of Rotherham have built an extension to their factory. The new shop is equipped with lifting cranes of 50 and 10 ton capacities. Modern welding equipment, including a submerged arc automatic welding machine, X-ray and testing facilities have been installed.

The extension has enabled the company to meet forward commitments for the second stage of the Calder Hall nuclear energy generating station and the new Chapel Cross station at Annan, Scotland.

COLLOID MILL

A new mill, especially suitable for the small manufacturer, has been marketed by Premier Colloid Mills Ltd. They describe this new machine as versatile, economical and simple to use, clean and maintain. It is fitted with a standard two-speed motor, which can be regulated to go at any speeds up to 8,000 r.p.m. or 12,000 r.p.m. as required.

It can be used for a variety of processes, including the preparation of fruit pulps for fruit cordials and tomato cocktails.

Since it only occupies 3 sq. ft., it saves space and is easily portable. Maintenance costs and power consumption are low, it is claimed.

LABORATORY FURNISHINGS

A new range of laboratory furnishings, made by C. S. A. Industries Ltd., is supplied in units of 21 in. wide (or multiples of 21 in.). The work tops of the cabinets are of uniform height and are connected up with special jointing strips to provide a continuous working surface, free from gaps and dirt-traps, all round the laboratory if desired. Included in the range are floor cabinets with work top surfaces and generous drawers and cupboards, tall floor cabinets with shelves, sink units with single or double sinks and drainers with large cupboards below, and matching wall cupboards for instrument and bottle storage. They are supplied in conventional white finish if required, but, alternatively, the cupboard doors, drawer fronts and handles are available in a choice of five contrasting colours at no extra cost.

General construction is in *Zintec* (high-grade sheet steel with rust-preventive zinc coating) with a choice of coloured *Formica* or stainless steel work tops. Sink tops can be stainless steel or vitreous enamel, and all materials have been selected for their resistance to laboratory conditions, and their hygienic qualities.

A free planning service is offered to firms contemplating a new laboratory or modernising an old one.

Some of the new range of laboratory furnishings supplied by C.S.A Industries Ltd.

AUTOMATIC WASHER

A £3,500 automatic washing machine capable of performing work done previously by 25 men, has been installed at the sausage and pie factory of Excel Ltd., at Stratford, London.

The first machine of its kind to be used in this type of factory, it is able to take every wooden or metal tray and mould used by Excel in the manufacture of their products.

Divided into washing and drying sections, the machine has a conveyor running along its entire length of 53 ft. This conveyor belt first carries dirty utensils to the washing section where water mixed with detergent is rained on to them at a pressure of 25 p.s.i. by a 10 h.p. pump handling 400 gal. a min. The temperature of the water is kept around 150°F. and the two detergent tanks are inspected three times a day by the factory's laboratory staff to ensure that the correct solution of detergent is being used.

Articles on the conveyor belt are rinsed in fresh water at 180°F. by a 5 h.p. pump at a rate of 200 gal. a min. The items are then carried through a loose hanging curtain to the scalding section where water at 200°F. is pumped on to them. The time taken for an article to pass through the entire washing section is 3 min., the conveyor belt travelling at a rate of 10 ft. per min.

After washing, the utensils slide on rollers down to the drying section. Here another conveyor belt carries them through the section where air at a temperature of 240°F. is fanned on to them from every angle.

After 2½ min. they are dry and sterilised, ready for immediate use anywhere in the factory.

Built by Dawson Brothers Ltd., the machine is based on suggestions made by members of Excel's staff. It can be operated by three men where previously 25 men were employed scrubbing the utensils in tanks of hot water and detergent.

As well as the saving in labour it is claimed that other costs are low. For example, water costs 1s. 5d. per day, and 5s. 3d. per hr. for the scalding rinse; while electricity to run the six motors on the machine costs under 2s. per hr. There is little wastage as the wash water is used in a circuit and is subjected to continuous filtration. Condensed steam from the heating coils is returned to the machine as hot water, thus saving fuel.

The machine is constructed of ⅛ in. thick steel plates, is 5 ft. 6 in. high at the washing section, and 5 ft. at the drying section. Its width is 4 ft. 6 in. throughout.

The automatic washing machine at Excel Ltd.'s factory. Utensils are fed into the entrance of the machine on the right of the picture.

Further information on the plant and equipment described in the foregoing pages can be obtained by writing to the Enquiry Service of FOOD MANUFACTURE (see p. 539).

News Digest

Price Fixing Condemned by Federation President

PROPOSED extension of the marketing board system was condemned by Mr. R. S. Worth, president of the Food Manufacturers' Federation, when he spoke at a luncheon in the Adam Rooms, Edinburgh, on November 8, prior to the annual meeting of the Federation's Scottish branch.

Speaking first of legislation affecting the industry, Mr. Worth said the Federation was not engaged in price fixation in any shape or form but they were engaged in trying to fix the policy which governed the way in which legislation affecting the trade took its form.

"We have been suffering for some time past from a whole lot of people, and indeed cranks, trying to introduce some form of controls to make our life more difficult. We as a Federation over the years have been concerned with food hygiene. We have been concerned with codes of practice. We are concerned with every form of legislation to improve the quality of our goods.

"We welcome legislation, but we don't welcome interference which is not responsible. We are more concerned to see that the trade itself gives the consumer what it wants and gives it in a hygienic way."

The new monopolies restriction act, with which he agreed, stopped price fixing; but at the same time the food manufacturers were having to deal with boards which fixed the prices of their raw materials.

"To me that is not freedom. I accept that in the farming community and perhaps with marketing milk we have to have these boards. But the extension of the board marketing system to cover eggs, bacon and the Lord knows what needs very careful thought.

Feather bed. "The farmer, I think, sometimes lives on a feather bed. It is right that he should be properly supported, but I don't think that everything he produces should be disposed of by him at a fixed price. The producer is living in a world apart from competition and I don't think it is fair for the rest of the community that that situation should exist. If we are going to compete under this monopolies restriction act then I think it is right that the farmer himself should be in a similar position to a certain extent."

Mr. J. R. Anderson Chivers, chairman of the Scottish branch of the federation, who presided, agreed with Mr. Worth, adding: "We are concerned above all things with quality; and with standard prices for the producers of these articles the tendency may be in some instances to forget the quality of their article; whereas in a free market there would be a better price for a better quality. The tendency might grow and we as manufacturers may find it very difficult to get the materials of first class quality that we desire to produce articles for the housewife."

Lord Strathclyde, Minister of State for Scotland, in a reference to the Food and Drugs Act, said that he hoped a final draft of the regulations for Scotland would be published around next spring. Draft regulations had been circulated and many organisations including their own had submitted comments. The federation's comments seemed to him to be very balanced and forward looking.

"We will also be drafting codes of practice," said Lord Strathclyde. "These will not have the force of law but will give guidance to those who have to comply with the regulations, and will show in detail what standards the efficient and public-spirited firm should reach."

Hands off meat pies!

Proposals that meat pies should be subjected to statutory control are being stoutly opposed by the affected sections of the food industry, with the backing of the Food Manufacturers' Federation. A speaker at the recent conference of meat traders in Eastbourne has urged a "tooth and nail" struggle against the proposals and a member of the National Association of Master Bakers has proclaimed in its *Review* the ringing call that "Freedom for the composition of meat pies is something we must all fight for: *Hands off our meat pies!*"

The other side of the controversy is represented by the health committee of the Association of Municipal Corporations which is strongly in favour of statutory control. Replying to a questionnaire submitted by the Food Standards Committee of the Ministry of Food, the association said that the percentage of uncooked lean meat in the total weight of the pie should be 25%. They also consider that if a pie is described as being of a specific kind of meat (*e.g.* pork) the whole meat content should be exclusively of that sort, while in mixed meat pies, the first-named meat should predominate with a second meat in a reasonable proportion. Other recommendations were that "meat" should be defined and that a pie containing vegetables or other filler should not be called a meat pie; that none of the "prohibited offals" should be used in pies; that pies should be labelled or marked with the amount of meat they contain; and that the only other ingredient of a pie besides meat should be condiment and gelatin. On the other hand they did not consider that the composition of the pie crust is particularly important.

The meat traders and bakers point out that when pies are made, cooking often affects their composition, no matter how carefully ingredients are weighed out. It would be dangerous to the trade if pie-makers had to run the risk of prosecution over the make-up of their pies. Like many food manufacturers they are suspicious of the "scalp-hunting" zeal of a few food analysts in making prosecutions.

Preservatives enquiry

The Preservatives Sub-Committee of the Food Standards Committee, in its review of the Public Health (Preservatives etc. in Food) Regulations 1925-53, is now considering representations received since it began its enquiry in respect of the use of anti-microbial agents in food. Any further evidence relating to the use of such substances which interested parties may wish the Sub-Committee to consider should be sent to the Joint Secretary, Preservatives Sub-Committee, Ministry of Agriculture, Fisheries and Food, Great Westminster House, Horseferry Road, London, S.W.1, **by December 31, 1956.**

Technical bookshop

All books reviewed in FOOD MANUFACTURE and other scientific or technical books may be obtained from:

Technical Books,
308, Euston Road,
London, N.W.1.
Telephone: Euston 5911.

Prompt attention will be given to all orders.

U.K.-Iceland fish dispute over

The 4½-year-old fisheries dispute between Britain and Iceland ended last month, when an agreement was signed in Paris.

Landing of fish from Icelandic trawlers will be resumed in the U.K. and the Icelandic Government has agreed to maintain its present fishery limits until the whole question of fishery limits has been discussed by the United Nations.

The dispute began in May, 1952 when the Icelandic Government declared fishery limits bounded by a line drawn four miles from prominent points along the coast, thus cutting off a number of large bays and a total of 5,000 sq. miles previously fished by British and other trawlers. Because of this, facilities for the landing and sale of Icelandic fish were withdrawn at Hull, Grimsby, Aberdeen and Fleetwood.

Before the dispute began, Icelandic trawlers supplied about 6·3% of all fish landed in Britain. The percentage has since been made up by increased landings from British and foreign vessels.

Fish hygiene and sanitation

Very few cases of food poisoning in Britain are due to fish, according to Mr. R. Spencer of the Department of Scientific and Industrial Research, in a paper presented to the Public Works and Municipal Services Congress held in London recently. He said that fish was one of the safest foods and that statistics for England and Wales during the past few years, showed that "fresh, unprocessed fish was hardly ever involved in food poisoning."

Nevertheless he stressed that the conditions under which fish are handled and processed make hygiene (the prevention of contamination by harmful bacteria) and sanitation (the maintaining of clean surroundings and clean handling conditions) very important.

Fish when first caught do not, usually contain any bacteria likely to endanger health. They do, however, contain many types of bacteria which can flourish on the flesh and make it sour or stale. The aim of hygienic and sanitary measures is to keep the numbers of these bacteria to a minimum and to prevent contamination of the fish by other bacteria which might be harmful to the health of the consumer.

Many bacteria can flourish at freezing point, the temperature at which it is customary to store fish before it is eaten or processed. So it is important to keep possible contamination to a minimum during the handling and storage.

Contamination can take place aboard trawlers during the handling, cleaning and storage of fish. Washing the fish has little effect in reducing subsequent spoilage. A major difficulty is that of keeping to a minimum bacterial contamination of fishrooms and surfaces with which the fish itself or the preserving ice come into contact. Wooden surfaces, unless painted and varnished, are likely to be heavily contaminated and practically impossible to wash really clean. Conditions in which gutting and washing are done have an important bearing on the prevention of contamination of the fish and adequate icing of the cargo is vital. In general, although the many difficulties inherent in the preparation and transportation of the fish to the home port are fully appreciated, the standards of hygiene and sanitation aboard trawlers is not entirely satisfactory.

Mr. Spencer said that the principal hazard during handling and distribution of fish is contamination during filleting and processing. The processing of fish is carried out under such a variety of conditions that it is impossible to generalise on the hygienic and sanitary measures involved. Factories range from modern ones with high standards to those in which contamination is unavoidable. Usually fish fillets intended for freezing are handled with greater care than fish to be sold as iced wet fish. The returnable wooden boxes used for the inland transport of fish are so difficult to clean efficiently between journeys that their continued use is to be deprecated.

Despite the excellent record of fish in relation to food poisoning the maintenance of high standards of cleanliness at all stages of the industry is very important. In some processes considerable improvements remain to be made.

Frasers' experimental building at Harold Hill.

Pilot-scale process-testing facilities

W. J. Fraser and Co., Ltd., have set up new pilot-scale process laboratories at Harold Hill, Romford, Essex.

The purpose of the new unit is to provide clients with facilities for easy, economical pilot-scale testing that can bridge the gap between research results and full-size design. The arrangements have been made essentially flexible, to accommodate as many different kinds of processes as possible.

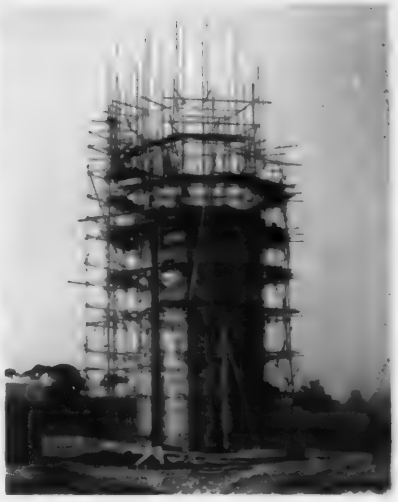
The unit consists of a central process building in which plants are erected, flanked by a chemical laboratory equipped with experimental distillation and normal analytical facilities, and by an annexe supplying services which include water, gas, electricity, steam, compressed-air and high and low vacuum lines. These are permanently piped round the process building and teed off at intervals for connection to pilot processes.

One of the plants installed is a *Dowtherm*-heated, stainless-steel, forced-circulation still for high-vacuum distillation of high-boiling organic liquids, which has contributed to the design and engineering of glycerine and fatty acid distillation plants for Fraser clients. Another unit is an open-circuit, pneumatic drier with a steam-heater battery to heat the incoming air and a cyclone separator and bag fitted to recover dried material. In the near future investigations will begin on a pulsed, liquid-liquid extraction column with perforated plate-packing.

Pilot-scale work has usually to be carried out quickly and in this case is expedited by the close linking of the new pilot unit with Frasers' chemical engineering works at Barnsley, where all plant for pilot investigation is made and where also Frasers carry out parallel researches in fabrication techniques and the use of special materials.

Oban kipper factory

Oban kipper factory, operated by John Jamieson and Co. (Fish Products Ltd.), of Aberdeen and Oban, who took it over early in the year and kippered a certain amount of herring towards the end of last season, will open again as soon as the season is under way.



The photograph above shows the cannery buildings under construction. *Right:* The water tower under construction. The factory will consume, at peak periods, 5 million gal. of water a week.

New Kent cannery will open in July

The £2½ million food factory being built by Batchelors Peas Ltd., at Ashford, Kent, will start part production next July.

The site covers 23 acres, the cannery buildings themselves covering 8 acres. The main production will be of processed and garden peas, followed by soup mixes, baked beans, canned soups, canned fruit, miscellaneous canned vegetables and packet peas, totalling more than 350 million cans and packets a year.

Plans have been laid for the installation of many fast-filling canning production lines and more than 100 electronic pea and bean grading machines.

Food fortification

Among the best known applications of vitamins A and D_3 is, of course, the fortification of margarine. In addition vitamin D_3 either alone or in association with vitamin A and others is widely utilised in food products ranging from soft drinks and "nightcap" beverages to the more basic items of everyday nutrients such as, in some countries, the fortification of fresh drinking milk, cheese and foods for infants, expectant mothers and invalids.

Except in the case of poultry foods, vitamin D_3 is the grade of vitamin D mostly used on account of certain given features and its appreciable lower cost. Under the trade mark *Astra* this vitamin is distributed in considerable quantities throughout the world and represents a traditional British export widely known and trusted for its reliability and quality. Marketed by a firm of specialists it is supplied as a crystalline powder of 40 million international units per gram, known as Calciferol, or in the form of stabilised vitamin D_3 oil concentrate of potencies up to 10 million I.U./g., based generally on refined groundnut oil or on other consumer selected edible vegetable or fish oils. It is also supplied based on a wide selection of dry powder carriers, combining the advantages of vitamin activity with the characteristics of the bulk substance and eliminating the problems created in some processes by the utilisation of oily solutions. In either instances vitamin A and other vitamins or ingredients can be incorporated.

The suppliers, Astra Chemicals Ltd., say that they are the only firm in the U.K. supplying the entire range of vitamin D concentrates.

New cherry flavours

A newcomer to W. J. Bush's *Witham* flavours is cherry, available in two varieties—black heart and white heart. It is suitable for all forms of sugar confectionery but is said to be outstanding in high boilings, chocolate centres. and jelly sweets. For sugar confectionery the suggested quantities range from ½ fl. oz. per cwt. for fondants to 1½ fl. oz. for gums and pastilles. For sundry foods quantities suggested range from ¼ to ½ fl. oz. per ten gal. for imitation cream to 6 fl. oz. per cwt. for blancmange and pudding powders. Samples are available from W. J. Bush and Co.

Slot machine manufacture

Discussions on the possible establishment in the U.K. of a plant to manufacture automatic vending machines were held in London recently between representatives of the Automatic Canteen Co. of America and the Board of Trade.

Automatic Canteen Co. which with annual sales exceeding $100m. claims to be the world's largest organisation in the automatic vending industry both as a machine operator and manufacturer, is considering manufacturing equipment in the U.K. where production costs are lower than in the U.S. From this country it would supply the sterling area and also export to the U.S. and Canada.

Water sampling standard

A revised edition of "Methods of sampling water used in steam generation" (B.S. 1328), covers requirements for the sampling and physical testing of water used in industry. It is published under the title of "Methods of sampling water used in industry."

It deals with size of the sample, with containers and their labelling, and with the sampling of water of the following types:

- Raw water
- Treated or softened water
- Feed water
- Boiler water
- Condensate and distillate
- Water from vessels under reduced pressure
- Water for the determination of dissolved oxygen

More attention has been paid in this new standard to relating the size of the sample and the type of container to the tests that are likely to be required on the sample. Similarly the suitability of new materials for containers has been taken into account, and the methods of sampling have been revised in detail and brought into line with modern practice. A description has been included of the submerged bottle technique for sampling for dissolved oxygen determination. An appendix covers the determination of this constituent by the starch method.

Copies of this Standard are obtainable from the British Standards Institution, Sales Branch, 2, Park Street, London, W.1. Price 6s. net.

Glass evaporation plant

Reprints of the article by Mr. R. Scott, B.SC., N.D.A., N.D.D., on "How to build and use glass evaporation plant" which appeared in the July issue of FOOD MANUFACTURE, are now available from Q.V.F. Ltd., Mill Street, Stone, Staffs.

PEOPLE

MR. R. M. C. NUNNELEY has been appointed general manager of Coates Brothers Inks Ltd. He has also joined the board of the parent company, Coates Brothers and Co. Ltd.

*

LORD LUKE, chairman of Bovril Ltd., has resigned from the presidency of the Incorporated Sales Managers' Association. He is succeeded by LORD WOOLTON.

*

DR. R. T. COLEGATE has again been elected chairman of the British Baking Industries Research Association. Exercising the powers conferred upon them at the annual meeting of co-opting up to six members the council again co-opted MR. E. N. MARTIN, whose term of office had expired, and also co-opted MR. J. PRICE of Craigmillar and British Creameries Ltd.

*

MR. W. D. MILES of the production department of Oppenheimer Casing Co. (U.K.) Ltd., and Mr. L. H. J. SMITH of the despatch department, were recently presented with gold watches by Mr. P. Graham Hart, the London managing director, and MR. L. W. J. Luckens, director, to mark the completion of 30 years' service with the company.

*

The following alterations to the board of Plenty and Son Ltd., have taken place as a result of the death of the chairman, MR. H. SHOOSMITH:

MR. G. T. SHOOSMITH, M.I.C.E., M.I.MECH.E., has been appointed chairman and managing director, and MR. M. A. H. WALFORD, A.M.I.MECH.E., A.M.I.MAR.E., deputy managing director.

*

PROF. A. C. FRAZER, chairman of the British Food Manufacturing Industries Research Association, was guest speaker at a two-day conference held by Albright and Wilson Ltd. at Oldbury recently. He spoke on "Food and Disease." The main theme of the conference was the prevention and treatment of accidents in chemical factories.

*

Obituary

MR. C. M. COATES, chairman of directors of Coates Brothers and Co. Ltd., died at his home in Lymington on October 30.

Mr. Coates was the son of the late Mr. George Coates who, with his brother—John William Coates, founded the firm of Coates Brothers in 1877. He spent 56 years in the printing ink industry and was actively interested in its progress until his last illness. He was the managing director of Coates Brothers and Co. Ltd., from 1929 until 1947, and was actively associated with the company's rapid development during the 1930's.

Dr. D. W. Kent-Jones, President, Royal Institute of Chemistry (*right*) with Dr. C. H. Bamford, chairman of newly formed Thames Valley Section of the Institute.

Food and drink—R.I.C. president's views

The first meeting of the newly formed Thames Valley Section of the Royal Institute of Chemistry was held at Reading University recently. After a short business discussion in which Dr. C. H. Bamford (Maidenhead) was elected chairman and Drs. T. G. Halsall (Oxford), P. F. Holt (Reading), H. M. N. H. Irving (Oxford), W. J. Kramers (A.W.R.E. Aldermaston), E. S. Lane (A.E.R.E. Harwell), D. T. Lewis (A.W.R.E. Aldermaston), R. N. C. Strain (Farnborough) and Mr. J. A. Radley (Reading) were elected to the committee, the president Dr. D. W. Kent-Jones delivered a lecture on "Food and Drink."

Dr. Kent-Jones pointed out the vital importance of the food problem today and the world's requirements of food as related to the enormous yearly increase in the world's population. There had been a continuous demand for improved nutritional levels throughout the world and this demand, as far as this country and a number of other western countries were concerned, was being well met. Advances in the preservation and distribution of food to various classes of population were now so effective that the poorer classes were no longer penalised by their low income to provide the necessary food of the right nutritional level for the family. Interesting statistics were presented comparing the quantity and nutritive value of food consumed by income groups ranging from £15 to £6 per week and it was satisfactory to notice that all were above the recommendations of the British Medical Council. Many nutritional and storage problems remained to be investigated but Dr. Kent-Jones considered that the chances of the diet consumed by anyone in this country today being insufficient in quality or quantity was very remote. Advances in preservation, storage and methods of transport of food had now led to the situation where the townsman was fed as well as the countryman.

Dr. Kent-Jones felt that considerably more attention should be paid to the cooking and the presentation of food in this country since partaking of a meal should be a pleasure as well as a necessity. Unless efforts were made to prepare a meal which was attractive in appearance, flavour and texture, the appetite fell away and the consumption of the food amounted to a penance more than a pleasure. Increased enjoyment of meals could be obtained by accompanying them with moderate amounts of a carefully chosen drink taken before and with the food. Taken in moderation such drinks added immeasurably to the pleasure and benefits of food but in excess it could become a "killer." This point led Dr. Kent-Jones to give a most interesting, although short, account of the biological effects of alcohol and their measurement, illustrating it with a number of amusing incidents that had come to his notice.

An interesting and often amusing discussion followed and the members and guests later adjourned to the Caversham Bridge Hotel for an informal dinner which was attended by about 40 of those present at the lecture.

Science and technology—post-graduate awards

By arrangement with the Ministry of Education and the Treasury, the Department of Scientific and Industrial Research has assumed responsibility for making practically all fresh awards from public funds to post-graduate students in science and technology. The awards will be made for training in research as in the past, but in addition will also be made for courses of advanced instruction.

This new arrangement does not alter in any way the fields of science and technology covered by the D.S.I.R. The awards for training in medical and agricultural science will be made, as they are now, by other bodies.

Brewers' banquet

The Yorkshire and North Eastern Section of the Institute of Brewing is holding its annual banquet at the Old Swan Hotel, Harrogate, on Friday, February 22, 1957, under the chairmanship of Mr. E. G. Peet.

Pascall's hosts to the Food Group

The Food Group of the Society of Chemical Industry held their 1956 Conversazione on Wednesday evening, November 14, at the Mitcham (London) factory of James Pascall Ltd. Group members and their guests were received by Mr. and Mrs. J. H. Bayfield on behalf of the hosts and Dr. A. J. Amos, chairman of the group and his wife.

Since they were founded, in 1868, James Pascall have made their reputation as manufacturers of hard confectionery and the visitors were able to see the intricate and fascinating combination of manipulative skill and specialised machinery needed to make multi-coloured and striped soft-centred sweets and other popular lines. In the pilot scale plant, Pascall's experts had produced for the occasion some sticks of familiar seaside rock with the letters S.C.I. " going right through." Visitors were told the secret of lettering rock. Pascall no longer have any interest in keeping this secret as it is 30 years since they manufactured this line.

One of the highlights of the Conversazione, as in previous years, was a showing of the film of the summer tour. This year's was in Bavaria (*see* FOOD MANUFACTURE, July, 1956) and the film, mostly in colour, revived pleasant recollections of the tour. The film was taken by Dr. Oliver, who supervised the screening and enlivened the proceedings with a genial commentary.

The conversazione ended with a much-applauded expression of thanks to James Pascall for their generosity in providing the food, drink and other facilities for a friendly end enjoyable evening.

Mono pumps abroad

Since opening branch offices in South Africa and Australia, the sale of the products of Mono Pumps Ltd. has grown sufficiently to warrant an extension of activities in those countries.

In South Africa an overseas subsidiary and a company to be known as Mono Pumps (Africa) (Pty.) Ltd., has now been formed to foster interest throughout the continent of Africa. The directors of this new company are: *chairman*—H. B. Hichens, M.B.E., B.A.HONS.(CANTAB.), M.I.MECH.E.; *managing director*—A. Taylor; *directors*—A. W. Gregory, J.P., R. R. Kennan, A.M.I.MECH.E., (alternate A. R. McCall). This company has purchased a modern factory and new offices in the Johannesburg district and will follow an independent line of developments suited to the circumstances and peculiarities of the area covered by the company.

The Australian branch has also established a works in a suburb of Melbourne for the assembly and manufacture of certain parts of the Mono pump so that the requirements of the Australian market are more adequately served.

OBITER DICTA

● A python in a butcher's shop turned " the women as white as ghosts." I hope some lisping cockney remarked; " One man's meat is another man's python." —*Beachcomber, Daily Express.*

● A local " cure " on the East African coast for the irritation caused by contact with jelly fish is a compress of mashed flesh of the paw-paw or papaya.—*Letter in Pharmaceutical Journal.*

● According to the Spanish proverb four persons are necessary to make a good salad: a spendthrift for oil, a miser for vinegar, a counsellor for salt and a madman to stir all up.—*Travers' Circular.*

● " But if you really want good food, ' down-under ' is the place. The steaks are juicier, the fish tastier and the fruit fruitier—except for the strawberries."—*Nancy Gepp, Australian visitor to England.*

● When a tin labelled " plums " was shaken, officers heard ticking. In the man's suitcase the officers found Swiss watches smuggled into the country labelled as Continental foods.—*Manchester Court report.*

● The other day Mr. Berkeley received from his constituents at Bristol a box of church oak, set with brilliants and worth a thousand guineas, for the zeal and ability he had displayed against a bill for the further closing of public houses on Sunday.—*The Times, 1856.*

● Two complaints regarding bread were concerned with black streaks running through the loaf. In both cases these were due to contamination with lubricating grease. This is presumably the penalty we have to pay for the privilege of eating bread " untouched by hand."—*Birmingham City Analyst.*

● In Tudor times, the quality of ale was tested by pouring some out on a wooden bench. A " conner " wearing leather breeches then sat on the bench and if he had difficulty in getting up, owing to the ale congealing, it was considered that the brew was of good quality.—*Imperial Smelting Corporation advertisement.*

Machinery firm's reorganisation

Bramigk and Co., Ltd., announce a financial reorganisation of their machinery business. The potentially catastrophic effect of death duties on an expanding family business has led the directors to seek amalgamation with an industrial engineering group to ensure continuity of development in spite of the hazards of modern tax law.

Brigadier J. B. Hillary, C.B.E., who has been managing director of Bramigk and Co. Ltd. since 1923, has announced the incorporation of the business into the Norcros industrial group (chairman: Mr. John Sheffield). The terms provide for strict continuity of Bramigk trading and development policy, including the retention of the key personnel. Mr. Hillary will remain chairman and managing director of Bramigk, whilst development of the various branches of the business, each under the direction of one of the younger members of the staff, will continue. The name of the company will be unchanged.

Bramigk and Co., Ltd., have always specialised in the supply of machinery and equipment used by chocolate, cocoa and confectionery manufacturers. The business was acquired by the late Mr. A. E. Hillary, father of the present chairman, when he relinquished his interest in Carsons Ltd., the chocolate and confectionery manufacturers, in 1912. The development of the firm was always the special care of his son, however, who left an army career in 1920 to take over this work. In the course of the last 36 years the scope of the business has been considerably expanded and it has been built up to a strong position.

Sets of drip mats

The Benjamin Electric Ltd., recently produced, in connection with exhibitions, and other publicity purposes, supplies of drip mats. There are three to a set, packed in *Cellophane* and suitable for works canteens and similar requirements.

Benjamin will be pleased to forward a supply of these free with their compliments on request.

"Margarine and other Food Fats"

We regret that a line was omitted from Prof. Yudkin's review, of the above book which appeared on p. 460 of our November issue. The second sentence should read, " It deals with ' unmanufactured ' fats like butter, as well as with manufactured fats such as margarine and cooking fats."

Margarine and other Food Fats is published by Leonard Hill (Books) Ltd., Eden Street, London, N.W.1, at 46s. 3d. In Prof. Yudkin's words " There is no other book which covers anything like the same ground."

Company Profits and Prospects

Bakery profits up

Allied Bakeries' group gross profits were £5,054,000 for the year ended March 31, an increase of £179,000 on last year. A dividend of 30% was announced in July.

High sweets profits

Group trading profits of Maynards, confectioners, reached a new record for the year to June 30, amounting to £378,530 compared with £374,047. The Ordinary dividend is being raised from 22½% to 25%.

Dividend maintained

Ordinary dividend of Batchelor (Ireland), food packers, for the year ended June 30, is 15% (same for 1954-55 but included a bonus of 5%). Trading profits advanced to £54,151 from £47,111, and, after tax of £19,090 (£17,675), net profits increased to £25,271 from £20,410.

Biscuit firm recovering

The 14% increase to £379,000 in consolidated gross profits of Wright's Biscuits for the year ended June 30 represents a partial recovery from the set-back suffered last year when gross profits fell by 30%. The dividend is held at 50%.

The group trading profit of a subsidiary, Wright's Cakes is down to £62,248 from £77,825, but the dividend on the £141,265 one-class capital has been raised by 2½% to 12%. A 25% scrip issue is also proposed.

Zwanenberg sell drug companies

Proceeds from the sale of the pharmaceutical companies have been received by Zwanenberg Associated Food Companies, formerly Zwanenberg-Organon, and the board now plans to repay in cash one-half of the nominal amount paid-up on each of the three classes of shares and to increase the Preference Dividend from 4½ % to 5½%. Following the reduction in capital it is proposed to increase it again to £900,000 by creating 720,000 Ordinary 10s. shares and 720,000 Deferred 2s. 6d. shares. The board does not contemplate any issue of shares at present. The accounting year is to be changed from December 31 to March 31.

New Smedley products

Modernisation and extension of his company's factories—particularly at Dundee, Faversham and Spalding—was reported by Mr. Wallace V. Smedley, chairman of the National Canning Co. Ltd., at the annual meeting. The quick-frozen side of the business had continued to grow to include fish, poultry, sausages and meat, besides fruit and vegetables. A new venture was quick freezing of fish which was being carried out by the recently acquired subsidiary, Ulster Fresh Fish Ltd., Portavogie, Co. Down. Among new products in the Smedley range was canned beefsteak and kidney pies.

A trading profit of £609,765 (£565,360) for the year to May 31, 1956, was declared and an Ordinary dividend of 20% approved.

Erections and Extensions

Schweppes Ltd., have had plans prepared for the erection of a depot at Bridge of Don, Aberdeen.

Brand and Co., Ltd., food manufacturers, are having plans prepared for building warehouse and office premises in South Lambeth Road, London, S.W.8.

Howell and Hall, Ltd., are having plans prepared for extensions to their bakery at Minet Drive, Hayes, Middlesex.

J. Lyons and Co., Ltd., have had an outline application approved in principle by the local Council for the erection of a distribution depot in Bridge Street, Goole, Yorkshire.

Orpro Food Products, Ltd., have been granted planning permission to build office premises at Woodlands Park Avenue, White Waltham, Berkshire.

Chelmsford Co-operative Society, Ltd., are planning to build a bakery and distribution depot at Coval Lane, Chelmsford, Essex.

Metal Closures, Ltd., have had plans prepared for the construction of a factory and welfare block at Kelvin Way, West Bromwich.

Scottish Grain Distilling Co., Ltd., will shortly build warehouse premises at Bridgton, Glasgow.

Joseph Dunn (Bottlers), Ltd., have been granted permission to proceed with plans for the erection of a lemonade factory in Rutherglen Road, Glasgow.

Nesmilk, Ltd., are having a fitters' and tinsmiths' shop built in Currock Road, Carlisle, Cumberland.

S. P. D. Ltd., opened their ninth new food warehouse in Britain, at Lindsay Road, Leith, Scotland. The main feature is complete palletisation from the factory production belt to the retailer's shop—a process which is said to save 60% of the labour normally used in food warehousing.

Rea's Creamy Ices, Ltd., of Middlesbrough, are planning to build factory premises of roughly 10,000 sq. ft. on a site in Longlands Road, Middlesbrough.

Fruitfield Preserves, Ltd., have had plans approved for the erection of production buildings and a gas chamber at their factory in Richhill, Co. Armagh, Northern Ireland.

Danish Bacon Co., Ltd., are planning to extend their factory at Cartwright Street, Loughborough, Leicester.

J. Rank, Ltd., have had outline plans submitted for the erection of premises at Clarence Street, Hull, for bulk flour storage.

S. Hill and Son, Ltd., bakers and confectioners, Longlands Road, Middlesbrough, Yorkshire, are planning the construction of a bakery on a 2-acre site near their present premises.

Wm. Macdonald and Sons, (Biscuits), Ltd., Glasgow, are having plans prepared for the proposed construction of a factory on a site at Nay-Smith Road North, Glasgow.

Holden and Brooke Ltd., manufacturers of centrifugal and reciprocating pumps, heat exchange plant and steam auxiliaries, have opened a branch office at 9, Broad Quay, Bristol. Telephone: Bristol 28581.

George Strathdee Ltd., the Aberdeen bakers have opened a £300,000 modern baking and confectionery factory at Northfield, Aberdeen. The plant is one of the most modern in the country concentrating on a very full range of bakery and confectionery products.

New furnace factory

Birlec Ltd., a member of the A.E.I. group and manufacturer of industrial furnaces and dehumidification equipment, is about to build a large electric furnace manufacturing plant on a 34-acre site at Aldridge near Birmingham. By the end of 1966 Birlec expects to have doubled its present number of employees.

Food News Overseas

Record salt harvest

A record salt harvest of 80,000 tons has been collected in Ceylon this year, whilst a further 20,000 tons are expected to be collected before the end of the year. As Ceylon's annual consumption is approximately 55,000 tons, a substantial surplus is available for export.

Nutrition Congress

The fourth International Congress of Nutrition will be held in Paris from July 26 to August 1, 1957. It will study scientific problems of nutrition, both in animals and in man, in their normal and their pathological aspects.

The Congress will comprise five specialised sectional groups covering nutrition and lactation, reproduction, the skin, digestive flora and senescence. A sixth sectional group will deal with all papers on any aspect of the scientific problems of nutrition outside the scope of the specialised sectional groups.

The Congress will be held under the presidency of Prof. Terroine.

Good yield of olive oil in Portugal

The olive oil harvest, in spite of unfavourable weather, was expected to be the best yet recorded for the poorer year in the natural two-yearly cycle of olive fruiting. 65 million litres are expected; the harvest in 1955-56 was 75 million and in 1954-55, 53 million. The Government is not yet ready to say when it will be able to relax the regulations by which oil for domestic consumption must consist half of olive oil and half of groundnut oil. These regulations have proved unpopular and in order to restrict clandestine traffic the production, sale and movement of olive oil has been subjected to strict controls. The internal price remains the same.

Fish canning reform

A decree has been issued in Portugal aimed at reducing fluctuations in the price of sardines to canners and at rationalising and reforming the industry.

Canned fish accounted for nearly 15% of Portuguese exports in 1955 and were valued at nearly 923 million escudos (£11,500,000). Canners have until now had to buy their fish through agents at the open fish auctions and

A Morton two-speed air pressure whisk with flour feeder attachment being examined by the French Secretary of State for Industry and Trade (Monsieur Maurice Lemaire) at the opening of the Paris Salon International de L'Equitement des Industries et des Commerces de L'Alimentation.

prices have varied considerably according to the variations in supply and demand; it has thus been difficult to plan and maintain a rational investment programme for improving canning installations, and the organisation of distribution and publicity campaigns abroad.

Uniform standards of quality have also not been maintained. The very large number of enterprises has also meant a proliferation of trade names and marks for similar products.

The Government has now ordered that the Association of the Fish Canning Industry and the Association of Sardine Fishing Shipowners should agree annually on a guaranteed quantity of sardines to be supplied, on the prices or limits of price variation to be applied to this and to any supplementary quantities and on means of supply when there are localised shortages. The Government will finance market surveys and publicity campaigns on behalf only of associations of producers and exporters with adequate resources, in conformity with regulations. Other steps are to be taken to promote the formation of these associations and the amalgamation of small businesses. Research on technical problems is also to be undertaken and technical information is to be disseminated.

New Egyptian sugar company

A new Egyptian sugar refining company called Société des Sucreries et de Distillerie d'Egypte has been formed to replace the Société Générale des Sucreries et de la Raffinerie d'Egypte, which was dissolved by Government order in September, 1955.

The new company's share capital will be £E12m. divided into 3m. shares of four Egyptian pounds each. A total of 37,500 shares is guaranteed to ex-shareholders, while the Government will hold 51% of the share capital.

Report on frozen fish

A report on frozen fish, issued by the Organisation for European Economic Co-operation, gives an account of a training course on the Improved Quality and Packing of Frozen Fish, held at Kiel, Germany last year. This was organised to exchange information on recent developments in the fish freezing industry.

The subjects discussed include handling of the raw material, technical problems of the fish freezing process, problems of packing and storing frozen fish, transport, marketing and other problems of frozen fish production and distribution.

Fruit juice powders

A new process for the production of fruit-juice powders from mangoes, oranges and papayas has been developed at the Central Food Technological Research Institute, Mysore in India.

Although fruit juice powders have not previously been manufactured in India, there is considerable scope for this industry since there is such a plentiful and cheap supply of fruit.

In the new process pretreated fruit juice is concentrated and mixed with powdered sugar, fortified where necessary with vitamins, mineral salts, colours, flavours and fruit acids. The juice is dried in a cabinet or vacuum drier, powdered and packed. It is claimed that the reconstituted juice, which is becoming increasingly popular for infant and child feeding, has almost the same nutritive value as fresh fruit.

The Institute has also worked out a process to obtain fruit pulp of uniform and smooth texture. Pulp produced under the new process is said to have a bright colour and appearance, good taste and flavour.

Sugar factory for E. Pakistan

The Glasgow firm of sugar machinery engineers, A. and W. Smith and Co. Ltd., a member of the Tate and Lyle group, announce that they have received from Pakistan Industrial Development Corporation an order for a complete sugar factory for erection in East Pakistan. An order for a second factory has been placed with a German firm, but it incorporates cane crushing equipment to be supplied by A. and W. Smith. Orders for cane crushing mills have also been obtained from Mauritius and South Africa. The total value of machinery reported by these orders, which were secured against severe German and French competition, approaches £1 million.

Pakistan protects starch industry

The Government of Pakistan has decided to grant protection to the starch industry for a period of two years ending September 23, 1958. An import duty of 36% *ad valorem* has been imposed on sago flour and the existing revenue duty of 18% *ad valorem* on imported maize starch has been converted into a protective duty. It was also announced that other assistance, more directly connected with increasing production, would also be given.

Fat consumption in Germany

Demand for fats in Western Germany advanced further last year and annual *per capita* consumption rose to 29·52 kg. (1951: 24·48 kg. 1954: 28·32 kg.). Because of a fall in milk production in 1955 with the abnormally dry summer, less butter was available and as only a modest volume of imports were authorised consumption actually declined. Demand for margarine, on the other hand, went further ahead and consumption per head is now double that of butter—yet its price is only one third as high. The margarine industry is still required to utilise domestic fats and oils to cover 5% of its total requirements. Producers complain that the product in question, rape-seed oil, costs 10% more than imported vegetable oils.

Another antibiotic approved for poultry

The U.S. Food and Drug Administration has announced that the Pfizer antibiotic oxytetracycline has been accepted as a suitable preservative for poultry carcases, after an extensive series of assays on its biostatic properties.

The appropriate formulations of oxytetracycline are commercially known as *Biostat*, which was recently shown to be of value for whale preservation, (*see* FOOD MANUFACTURE, November, 1956, p. 496).

Technical Press Review December

Dairy Engineering.—Review of the 70th Dairy Show; Ozone in the Dairy Industry; The Dairy Industry in Brazil, 2; Manufacture of Butter, Cheese and Other Milk Products; Towards Increased Consumption of Milk; Ice Cream Problems and Progress; A New Phage Resistant Starter Medium for Cheese Manufacture.

World Crops.—The U.S. Department of Agriculture; The Role of the National Institute of Agricultural Engineering; The Work of F.A.O.; Commonwealth Agricultural Bureaux Organisation.

Automation Progress.—Automatic Control in the Process Industries, 2; Work Handling Within Machine Tools; Automatic Translations from French; Production Control by Computer.

Chemical and Process Engineering.—Uranium Production and Atomic Energy in France; Depreciation and Maintenance of Chemical Plant; Grinding in Industry.

Manufacturing Chemist.—Liquid Detergents from Alkyl Benzene Sulphonates; Liquid Nitrogen—A New Grinding Technique; Organo-Tin Compounds Find New Uses; Products used in the Treatment of Mastitis of the Dairy Cow.

Fibres.—Keeping Fabrics Clean; Wool Processing and Technology; International Conference on Textile Labelling.

Paint Manufacture.—Manufacturing Paints for Buildings and Industrial Plants.

Corrosion Technology.—Protecting Steelwork from Rust; Hot Dip Galvanising Plant; Corrosion Resistance of Aluminium.

Petroleum.—Indian Petroleum Industry; Search for Oil in Australia.

Atomics.—Nuclear Power and Gas Turbines; Waste Disposal at Windscale; Manufacture of Boron-10.

Floors.—Wood; its Properties as a Flooring Material for Various Purposes; Insulation of Composite Concrete.

Lemon centenary

The Californian lemon industry is celebrating its hundredth anniversary this year. Commercial lemon growing was first established in California as a direct result of the gold rush of 1849. Since the Second World War the U.S. has become the world's principal lemon producer, 90% of these being grown in California.

Dehydrofreezing tested commercially

After several years of laboratory and pilot-plant research on dehydrofreezing of fruits and vegetables, commercial adoption of the method is getting well started.

The process consists of freezing fruits and vegetables from which slightly more than half of the water has been removed, enough to reduce weight and volume by half. The U.S. Department of Agriculture's Western Utilisation Research Laboratory in Albany, California, has conducted extensive research and has obtained a public-service patent on the method. The investigations have established that, for many fruits and vegetables, the point of optimum moisture removal is approximately 50% of the weight and volume. That is, if the products retain 35 to 40% of their original moisture they can be frozen, thawed, and rehydrated with retention of original quality. Thawing and rehydration can take place simultaneously and under control to obtain any desired final moisture level.

The first commercial trials have revealed advantages for dehydrofrozen foods in re-manufacture and in large food-service establishments, with consumer packs a possible later development. Dehydrofrozen apricots for preserve manufacture, peas and carrots for soups, apples for the bakery trade, and various products for quartermaster or institutional use have undergone, or are undergoing trial at present.

British ventilating equipment for U.S.

In 1955 and 1956 Colt Ventilation Ltd. carried out extensive market research in America and satisfied themselves that there was a vast potential for their equipment there, although the market was highly competitive. It was decided to open a branch company in the U.S. Accordingly the managing director, Mr. I. J. O'Hea and director and general manager, Mr. M. J. Reaney, spent a considerable time there and decided that the ideal location for the company would be Los Angeles. Early this year the company was formed and stocks of equipment were shipped. The address is, Colt Ventilation of America Inc., P.O. Box. 27101. 4652, Hollywood Boulevard, Los Angeles, 27.

Mr. H. M. McLean, area manager for Scotland, was appointed to take charge of the new company. He arrived in Los Angeles in October. In the meantime Mr. Reaney had spent some months in Los Angeles dealing with the hundred and one details of organisation involved in such a venture and, to coincide with Mr. McLean's arrival, of organising a series of lectures on ventilation, which were given to selected groups of American architects, engineers and industrialists.

Packaging

Tubed foods for Antarctica

Stores for the S.S. *Magga Dan* which left for the Antarctic with Dr. V. E. Fuchs' main party on November 15 included over 350 tubes of various British food concentrates primarily for the Trans-Antarctic Expedition's reconnaissance parties.

With anticipated temperatures of 65° below zero, it is believed that the tubes will help to keep foodstuffs from freezing as well as make for easy division among the sledging patrols.

Several hundred tubes of food have already been dispatched to Sir Edmund Hilary for his parties operating from Ross Base.

Transparent biscuit pack

An attractive package has been designed for Powell's Biscuits Ltd.'s new line—*Chocolate Table Fingers*. Nine of the "fingers" are packaged, side by side, in a transparent bag of moisture proof *Cellophane*. The bag is boldly printed at the edges in red and white but the centre is left plain so that the biscuits can be clearly seen. After being filled the bag is heat-sealed on a hand-operated crimp-sealer.

The moisture proof *Cellophane* film protects the biscuits and keeps them in factory-fresh condition. This low-cost and simple method of presentation has helped to keep down the retail price of the pack which, at 6d., is ideal for self-service stores.

Carton test

The Citrus Marketing Board of Israel are to use 1½ million cardboard cartons this year for the export of citrus fruit as a further experiment to determine whether these cartons are superior to the wooden cases traditionally used.

"Chocolate Table Fingers" packed in transparent paper.

All-purpose pack

A new carton, the *Hermetet*, said to ensure a simple yet fool-proof method of providing an airtight pack for a wide variety of products in a number of industries has been introduced by the Pearlite Box Co. Ltd.

The *Hermetet* pack comprises a card or paper carton containing a closely associated inner wrap of the heat-sealable type. This inner wrap can consist of any kind of material the product demands—p.v.c., polythene, cellulose film or a laminated film, and may be either moisture-proof or non-moisture-proof ("breathing" type). The novelty of the pack, however, is claimed to lie in the special method of cutting, creasing and folding the outer wrap, and in the method whereby the inner wrap can be sealed externally, as an integral operation, preventing adverse effect on the product, either through heat transference or through ill-effects due to odour contamination. After the heat-sealing operation has been carried out on the projecting flap of the inner wrap, this flap is locked down to the external wrap by means of an appropriate adhesive. There is no special impregnation of the outer carton, the main protective character of the pack depending upon the qualities of the inner lining, thus allowing a greater degree of standardisation of the basic pack to be obtained.

The *Hermetet* machine, originally designed in Sweden will be manufactured in this country by Pearlite under licence, in association with a subsidiary of I.C.I., The Paper Goods Manufacturing Co. Ltd.

Next month's FOOD MANUFACTURE will contain a preview of the 1957 Packaging Exhibition to be held at Olympia, London, from January 22 to February 1.

A more economical printing method saves 2½d. on every pound of foil used for wrapping this butter.

Economical foil wrap

A saving of 2½d. on every pound of foil for butter-wrapping purposes is now being achieved as a result of a new type of wrap introduced by Venesta Ltd., in which the foil is printed on the dull side. The method involved is simpler—and consequently more economical—than printing, or embossing, the design on the bright side.

At the same time the company has developed a method of punch-hole registration which ensures that the design is automatically centred on the pack.

Heat-sealed bags

A patented foil bag with a hermetically-sealed plastic lining, designed with special cut-outs in the gussets so that the bag can be effectively heat-sealed across the top, has been added to the range of bags produced by E. S. and A. Robinson Ltd. Known as *Plyoflex*, it is believed to be the only plastic-lined foil bag which can be completely heat-sealed.

Standard *Flex-O-Foil* consists of aluminium foil bonded to paper. The new *Plyoflex* bags are similar in external appearance to *Flex-O-Foil* but they can be lined with any sheet plastic in any required gauge. The fact that the cut-out gussets allow the bags to be heat-sealed makes them valuable for packing products where a high degree of protection against moisture, grease and odours is needed.

Trade Marks

CASANOVA.—753,366. Meat; fish, poultry and game (other than live fish, live poultry and live game); meat products, fish products, poultry products and game products (all for food); fruits and vegetables, all being preserved, dried, cooked, bottled or canned; dairy products (for food), artificial cream, edible oils, edible fats; jam and marmalade; jellies (for food); and soups. **Brian, Jenks and Co., Ltd.,** Sabian House, 26-7, Cowcross Street, London, E.C.1.

CHINESE FIGS.—752,573. Fig confections, being articles of confectionery. **Batger and Co., Ltd.,** 566, Cable Street, Stepney, London, E.1.

COZVALE.—752,599. Jams and marmalade. **Edward Stanley Brock,** 40, Beaumont Street, Milehouse, Plymouth.

CROSSWALL.—B752,067. Meat; fish, poultry and game (none being live); meat extracts; preserved, dried and cooked fruits and vegetables; and dairy products (for food), jellies (for food), jams, edible oils, edible fats, fruit preserves, vegetable preserves and pickles. **S. Daniels and Co., Ltd.,** Oxford House, 15, Crosswall, London, E.C.3.

DUEX.—752,569. Edible oils and edible fats. **Thomas Hedley and Co., Ltd.,** Phœnix Buildings, Collingwood Street, Newcastle-on-Tyne.

DUTCH MILL.—751,436. Margarine. **Remia N.V.,** Dolderseweg 3, Den Dolder, Holland, and c/o A. A. Thornton and Co., Napier House, 24/27, High Holborn, London, W.C.1.

ESTORIL.—B731,920. Sardines in olive oil. **Veiga, Ltd.,** Rua Oriental do Mercado, Setubal, Portugal, and c/o Wheatley and Mackenzie, 376/379, Strand, London, W.C.2.

GLUCOPHYLL.—752,243. Non-medicated confectionery, containing glucose. **Meggeson and Co., Ltd.,** Llewellyn Grove, Llewellyn Street, Bermondsey, London, S.E.16.

GRANETTE.—747,389. Biscuits (other than biscuits for animals). **The International Biscuit Co., Ltd.,** Progress Works, Ayres Road, Old Trafford, Manchester, 16.

New Companies

John Aperghis (Dried Fruits), Ltd. (570205.) 2/3, Norfolk Street, London, W.C.2. £500. Dirs.: J. E. and Daisy K. Aperghis.

Reg. Beales, Ltd. (570426.) Doughty's Jetty, Fish Docks, Grimsby. Fish mchts. and fishmongers, etc. £1,000. Dirs.: R. J. H. Beales and R. R. Chilvers.

Collins Bros. (Stafford), Ltd. (570497.) Bakers, confectioners, etc. £6,000. Subs.: G. Collins, 2, Thorneyfields Lane, Stafford, and L. H. Collins.

R.T.P. Crisps, Ltd. (570332.) 11, Bennetts Road, Washwood Heath, Birmingham. Mnfrs. of potato crisps. £25,000. Dirs.: H. A. E. Round, K. Taylor and H. Price.

C.D.K. Fisheries, Ltd. (570496.) 19, Cavendish Road, Leeds. £5,000. Fish and oyster mchts., etc. Dirs.: C. D. and Mrs. M. I. Knockton.

A. H. Gayes, Ltd. (570493.) 88, Turnham Green Avenue, Chiswick, London, W.4. Importers and buyers and sellers and mchts. of meat, etc. £1,000. Dirs.: F. C. Wood and C. P. and Mrs. Q. J. Beacon.

Howards (Whetstone), Ltd. (570521.) Bank Chmbrs., 83/5, St. Mary Road, London, E.17. Market gardeners, greengrocers, fruiterers, etc. £1,000. Permt. dirs.: A. F. and R. W. Howard.

Johns (Chiswick), Ltd. (570518.) 44, Turnham Green Terrace, Chiswick, London, W.4. Importers and buyers and sells of and dlrs. in meat, etc. £1,000. Subs.: G. Schapiro and S. Usiskin.

A. Killingback and Son, Ltd. (570718.) 91, Main Avenue, Spitalfields Market, London, E.1. Vegetable mchts. and commission salesmen. £1,000. Dirs.: E. A. Stanton, Mrs. E. B. Brown and Mrs. W. L. Fleming.

J. H. Lee (S. Albans), Ltd. (570676.) 11a, St. Albans Road, Watford, Herts. Corn and grain factors and brokers, etc. £100. Dirs.: R. D., Mrs. M. C. and A. R. Barton.

W. H. Perks, Ltd. (570353.) 243/245, Great Lister Street, Birmingham, 7. Corn, seed and oil mchts., millers, etc. £8,500. Dirs.: W. H. and Grace A. Perks, and M. F. Green and H. W. Perks.

Albert Randall, Ltd. (570293.) Wyre Dock, Fleetwood. Wholesale fish mcht. £1,000. Dirs.: A. and Mrs. N. Randall.

Reeden Poultry Marketing, Ltd. (570404.) £100. Dirs.: J. Eden, Greenacres, Sessay, Thirsk. G. and E. Reed.

Shuman's, Ltd. (570335.) 40, Portland Place, London, W.1. Growers of and dlrs. in fruit and vegetables, etc. £100. Dirs.: C. Shuman and Wilhelmina G. Gordon.

A. E. Stapley, Ltd. (570238.) 1/3, Dale Street, Chatham, Kent. Grocer and provn. mcht. £1,000. Dirs.: A. E. and Mrs. G. Stapley

From Jordan and Sons, Ltd., Company Registration Agents, 116, Chancery Lane, London, W.C.2.

New Scottish Companies

McGregor and Co. (Leith), Ltd. (31240.) Quayside Mills, Church Street, Leith. Millers and grain merchants. £100,000. Dirs.: G. A. and C. G. McGregor.

The Consolidated Tea and Lands Co. (Ceylon), Ltd. (31276.) To cultivate tea, coffee, cocoa, grain, rice, etc., in Ceylon or elsewhere. £100. Subs.: H. S. McCallum and G. M. Rhodes, both of 172, St. Vincent Street, Glasgow.

Murro Brothers, Ltd. (31284.) 72, Lynedoch Street, Greenock. Manufacturers of and dealers in ice cream, chocolate, etc. £1,000. Dirs.: Dominci, Andrew and Louis di Murro.

The Capital Lime Co., Ltd. (31296.) Manufacturers of and dealers in grain, seed and forage, flour and meal, etc. £1,000. Subs.: Joseph Brankin, 771, Dumbarton Road, Glasgow, and Walter Simpson, jnr., 65, Firview, Ashgill, Larkhall.

Doughnuts (Dundee), Ltd. (31336.) 69, Balgowan Avenue, Dundee. Manufacturers of and dealers in prepared doughnut flour, cake flour, waffle mixtures, flour, biscuits, chocolate, etc. £1,000. Dirs.: Wm. Keir and James Kenneth.

Harry Wallace (Buckie), Ltd. (31348.) 32, Low Street, Buckie. Bakers, biscuit manufacturers, etc. £2,000. Dir.: Harry Wallace.

Noble Brothers (Fraserburgh), Ltd. (31809.) Fraserburgh, Aberdeenshire. Preserved provision manufacturers, curers of and dlrs. in fish. £4,000. Dirs.: Mrs. Ann Noble, Mrs. C. R. McCann, Ian Smith and George McCann.

COMPANY MEETING

VITAMINS LTD.

Cost of drugs only 5% of Health Service bill

At the Annual General Meeting of Vitamins Ltd., held in London in September the Chairman, Mr. H. C. H. Graves, said that Group Trading profit for 1955-56 before tax was £188,828 (£181,330). Dividend would be maintained at 15%, paid on the bigger capital resulting from last year's "rights" issue.

The Chairman drew attention to the misleading impression in existence concerning the cost of drugs to the National Health Service.

The shareholders—and 99·99% of the electorate of this country—had been led, he said, to believe by those who, in his opinion, should know better, that if the National Health Service foundered on the financial rocks, it would be due to the "high cost of drugs." Such a statement or impression was the reverse of the truth. Of the total cost of the National Health Service the cost of the medicines which it used accounted for 5%—the other 95% was made up of other costs including administration. The 1955-56 estimates alone showed an *increase* of £41 million in the "other" costs, a sum greater than the whole of the drug bill for the year. The concentration of public attention on the 5%, however, had undoubtedly served as a most effective diversionary effort or smoke screen to obscure criticism of the other 95% of the expenditure.

During the past financial year sales of Bemax had set a new record in excess of anything achieved in the post-war era. It was no doubt a tribute to the marked effect on health of regular Bemax that the product was so well known throughout the length and breadth of the land, and indeed in most parts of the civilised world.

We heard many complaints these days of a feeling of frustration, or of undue fatigue or of being under par. We heard of listless children, of infants who did not grow up as quickly as they should. The National Health Service treated them and us when we were ill, but what about when we were not ill but below par? It was that twilight stage, that stage of betwixt and between, which most dramatically benefited from the steady use of Bemax. How different many of the frustrated and listless would be on Bemax. If, like some recipes, Bemax was unpleasant and not easy of acceptance, it would be understandable for there to be abstainers from its use, but, on the contrary, Bemax with milk or fruit juice, in soup or sprinkled on cereal foods, was so delicious and added such zest to life that it was incredible that anyone who had the opportunity should fail to give it a trial.

The report and accounts were adopted.

Information and Advice

This Service is available to subscribers to FOOD MANUFACTURE. If a stamped addressed envelope is enclosed replies will be sent by post, but enquiries cannot be answered by telephone.

Ice cream mix

B.7881. *We wish to make an ice cream product which can be simply mixed with water or milk and frozen in a refrigerator. Can you supply a formula?* (Auckland, New Zealand)

We suggest that you experiment with the following:

	lb.
Full cream milk powder	14.25
Sugar	13.00
Margarine	6.00
Gum tragacanth	0.50
Glyceryl monostearate	0.50
Water	65.75
	100.00

The mix is prepared in the ordinary way and after homogenisation is placed in an evaporator until about half of the water has been removed. The process is completed in a spray drier.

It may be asked why so much water should be added when the whole of it is to be removed in processing. The reason is that this amount of water is required to dissolve the whole of the milk powder and thus ensure a uniform mix.

Orange squash

B.7934. *Have you a recipe for fruit squash, suitable for use in coffee bars and bottling?* (London, W.1)

An orange syrup suitable for these purposes can be made from the following formulae. First make the beverage base by mixing:

Concentrated orange juice 65° Brix	1 gal.
50% citric acid solution	20 fl. oz.
10% pressed orange oil emulsion	18 fl. oz.
Water	26 fl. oz.
Total beverage base	1½ gal.

To make the syrup mix:

Orange beverage base	1 gal.
Benzoate of soda	0·85 oz.
Sugar	25 lb.
Water	2⅛ gal.
Total orange syrup	5 gal.

Either plain or carbonated water can be added to this syrup.

For fuller information, see "The Chemistry and Technology of Fruit and Vegetable Juice Production" by D. K. Tressler and M. A. Joslyn.

Discoloured potatoes

B.7962. *Is there any method of treating peeled potatoes so that they will not discolour?* (Birkenhead)

In the December, 1955, issue of FOOD MANUFACTURE (*pp.* 499-501), we published an article entitled "Why cooked potatoes blacken," by H. G. Wager, of the Low Temperature Research Station of the D.S.I.R. Mr. Wager mentioned that one of the causes of discoloration in cooked and uncooked potatoes is the oxidative enzymic formation of melanin, when peeled potatoes are left to stand raw in air. It can be prevented by keeping oxygen from the tissues by immersing the potatoes in water, where the oxygen content is likely to be low. Thorough washing of the peeled potatoes, which removes damaged cell contents, also helps.

You should read Mr. Wager's article for fuller information.

Information supplied

The Enquiry Service has dealt with requests for names of manufacturers and suppliers of plant, machinery and materials, and also general information as follows:

B.7921. *Literature on food preservation.* (Milford-on-Sea, Hants.)

B.7922. *Advice on processing peanut kernels.* (Patrington, Yorks.)

B.7923. *Suppliers of drying chambers for macaroni dough.* (London, W.C.1)

B.7924. *Suppliers of machines for making peanut butter.* (Hong Kong)

B.7925. *Suppliers of spray and tumbling machines.* (Donegal)

B.7926. *Suppliers of check weighing machine.* (Tipton, Staffs.)

B.7927. *Information on stiffening home rendered lard.* (Hull)

B.7928. *Information on canned bread.* (Belfast)

B.7931. *Suppliers of black molasses.* (Grantham)

B.7932. *Information on banana flakes.* (Gateshead)

B.7933. *Suppliers of gloves for food handling.* (London, S.E.1)

B.7934. *Recipes for citrus fruit compounds.* (London, W.1)

B.7935. *Information on luncheon meat canning.* (Belfast)

B.7936. *Information on conveying of fruit.* (Coventry)

B.7937. *Information on bottling of chocolate flavoured milk.* (Kingston, Jamaica)

B.7938. *Information on making icing sugar.* (Antwerp, Belgium)

B.7943. *Information on making long cut and short cut hams.* (London, S.E.1)

B.7944. *Recipe for fig jam.* (Derby)

Recent Patents

759,478. GUARDITE CORPORATION: Precooked cereal food and method of making same.
759,487. EUK CATERING MACHINERY, LTD.: Boiling or cooking apparatus.
759,154. G. SOLWAY: Horticultural and agricultural implement.
759,367. F. J. JOPSON: Hoppers for delivering feedingstuff to animal feeding troughs.
759,273. L. C. GRANT, LTD.: Machines for shelling rice and other hard kernelled grains, seeds, nuts and beans.
759,296. E. C. KUNZ: Animal feedingstuffs.
759,223. F. THEEGARTEN: Sugar batch rolling machine.
759,238. H. L. COTTRELL (W. GERBIG GES.): Sterilisation of liquids and foodstuffs, in particular milk.
759,503. ELDORADO ICE CREAM CO., LTD.: Means for continuously feeding webs of material.
759,835. J. GILCHRIST: Method of forming and assembling egg cartons and apparatus for folding same.
759,590. BRITISH THOMSON-HOUSTON CO., LTD.: Food-waste disposal apparatus.
759,643. FORGROVE MACHINERY CO., LTD.: Machines for forming and wrapping shaped blocks of margarine, butter or like plastic substances.
759,883. CAPON HEATON AND CO., LTD.: Refrigerators, ice boxes or the like.
759,746. W. G. GARE: Appliance for picking apples, pears, plums and like fruit.
760,011. A. ROSENBERG: Animal feeds.

ABSTRACTS OF BRITISH PATENTS

Flour/bran separator

One or both displacing members at the inlet or outlet ends of a sieve cylinder are hollow for the passage of circulating air (parent patent), and the feed worm shaft carries spaced bars which are disposed parallel to the shaft and have parts formed as adjustable transversely and radially extending blades.—754,244. *Miag Muehienbau und Industrie Ges.* (*Germany*).

Preparation of food

Food is placed in a sealed metallic-walled oven in superheated steam at high pressure, and the walls are heated to a temperature above that of the steam to cause the latter to condense into the food.—754,510. *Engwall and Co. Kommanditbolag, V.T.* (*Sweden*).

Bulk confectionery

A continuous stream of a starting mixture (*e.g.* for boiled sweets) flows by gravity over a supporting surface and undergoes evaporation by H.F. electric heating.—754,601. *M. V. C. Jamin.*

Food preservation

Food hermetically sealed in a container is stored at or below 0°C. for long enough to convert the atmospheric and absorbed oxygen in the food into stable compounds, whereupon the sealed food is subjected to a sterilising dose of penetrating ionising radiation.—754,336. *Electronised Chemicals Corp.* (*U.S.A.*).

Sausage meat

Trisodium pyrophosphate or its hydrate, Kurrol's salt (K metaphosphate) or other condensed alkali metal phosphates are incorporated in sausage meat to cause swelling and softening of the muscle fibres giving more uniform fat distribution. Pickling agents such as nitrates, nitrites, NaCl, glucose or other carbohydrates, or other agents with a negative heat of solution are also incorporated.—754,406. *Chemische Fabrik Budenheim A.G.* (*Germany*).

Batter coating

An endless conveyor carries fish, etc., past a device which coats them with batter.—757,349. *Lyons and Co., Ltd.*

Removal of spent hops

An installation comprising a means to connect the interior of a brewing apparatus to a liquid supply (in the form of pressure jets) to give a slurry with the spent hops, and a means for connecting the interior of the apparatus in a circulation system, including an external separator to remove hops entrained in the slurry.—757,588. *A.P.V. Co., Ltd.*

Preparation of egg products

Egg is treated with an acid liquid medium which dissolves or transforms the shell so that it loses coherence; the membrane surrounding the egg remains intact and the treated egg is separated from the acid medium and undissolved shell. The egg contents are heated *in vacuo* to remove water, and the yolk and white separated from the dried material.—757,479. *B. J. A. Nijdam et al.*

Confectionery manufacture

Fluid chocolate, etc., is pumped from a tank to moulds through valve-controlled nozzles in the surface of a plate mounted under the tank base, which plate carries the conduits for the respective nozzles, to provide uniform simultaneous delivery to all the nozzles. The pump pistons and the valves are actuated by a combined driving mechanism.—753,463. *S.A. Macchine Industria Delciaria Carle and Montanari* (*Italy*).

Animal feed compositions

A composition which comprises an animal feed which normally causes a reduction of prothrombin in the blood level (*e.g.* solvent-extracted soya bean oil meal, etc.) mixed with sufficient of a water-soluble bisulphite addition product of a 2-methyl-1,4-naphthaquinone to maintain normal prothrombin blood levels. The composition is used particularly for poultry feeds.—755,798. *Abbott Laboratories, Inc.* (*U.S.A.*).

Manufacture of butter

80% cream obtained by centrifuging at a raised temperature is canned and sealed without temperature drop, the cans are then subjected (without cooling) to a temperature of 100-120°C., and are finally cooled to 0-20°C., to form butter by phase conversion.—755,727. *Unilever, Ltd.*

Chocolate enrobing machine

Material from a large mass of tempered coating material is showered downwardly from a bottom outlet on to articles to be enrobed, and the waste is returned to the top of the mass by mixing it with melted material being fed into the latter.—755,770. *E. T. Oakes Corp.* (*U.S.A.*).

Chocolate manufacture

Constituent materials are ground and mixed before the pulverulent mixture is subjected to pressure.—757,110. *W. P. G. Sech.*

Ice cream freezer

A small capacity motor-driven freezer has a driven shaft secured to a rotatable mixing bowl, and a motor-actuated driving shaft is engaged and disengaged from the driven shaft by mounting the motor on a pivotal carrier.—757,682. *P. Carpigiani* (*Italy*).

Purifying sugar solutions

A sugar solution containing dissolved impurities including colour bodies, is brought into contact at 130-210°F., with a porous quaternary NH_4 anion-exchange resin, which is in salt (*e.g.* chloride) form. c.f. B.P. 670,348 and 670,438.—757,866. *Rohm and Haas Co.* (*U.S.A.*).

Food blanching apparatus

A bucket-type endless conveyor carries peas, etc., in small quantities through an elongated blanching bath.—757,729. *Braby and Co., Ltd.*

Bottle crate

Upwardly projecting resilient plastic fingers on the base of the crate define bottle spaces and have longitudinal bottle-engaging fins.—754,312. *E. K. Cole.*

Bottle labelling machines

Positioning of bottles, etc., for neck-banding, etc., is effected by an intermittent conveyor, and an independent mechanism which applies a unidirectional turning pulse to the bottle at each dwell point (*i.e.* to orientate a tear-drop on the bottle neck).—754,313. *G. J. Meyer Mfg. Co.* (*U.S.A.*).

Food mixer

Blender blades on a horizontal shaft which is drivable by the motor of a food mixer are located in a recess in the bottom of a side wall of a receptacle for solids, etc., to be comminuted and blended.—751,875. *Hoover, Ltd.*

British abstracts are published by arrangement with the Technical Information Co., owners of the Patent Abstract Journal.

FOOD MANUFACTURE

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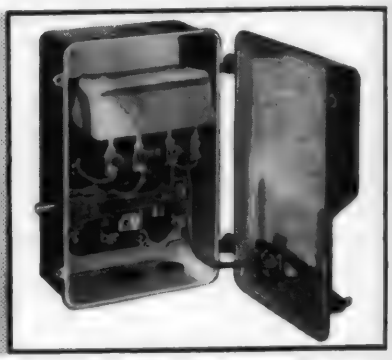

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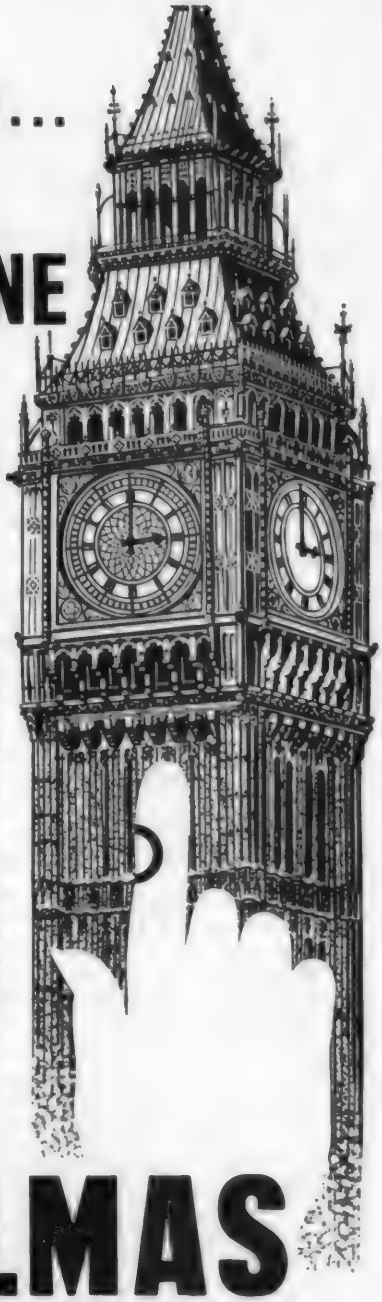

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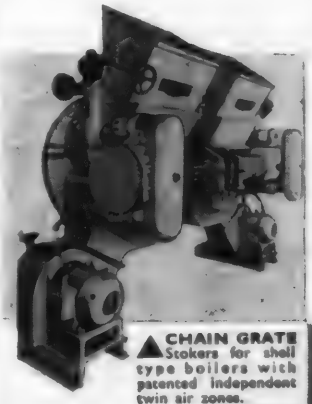

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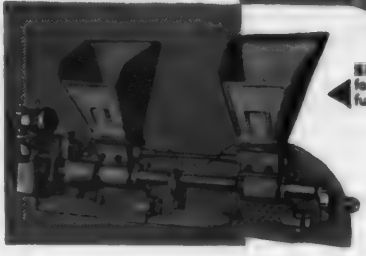

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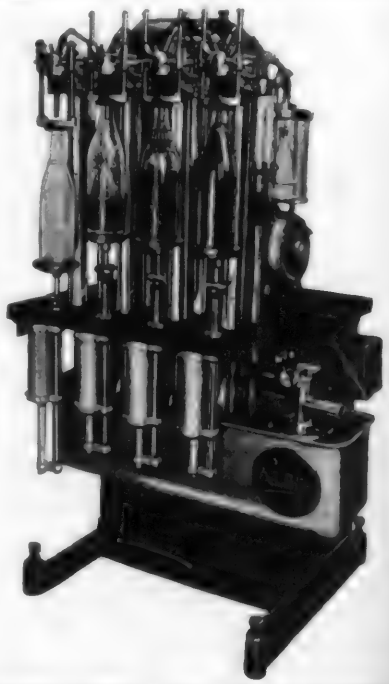

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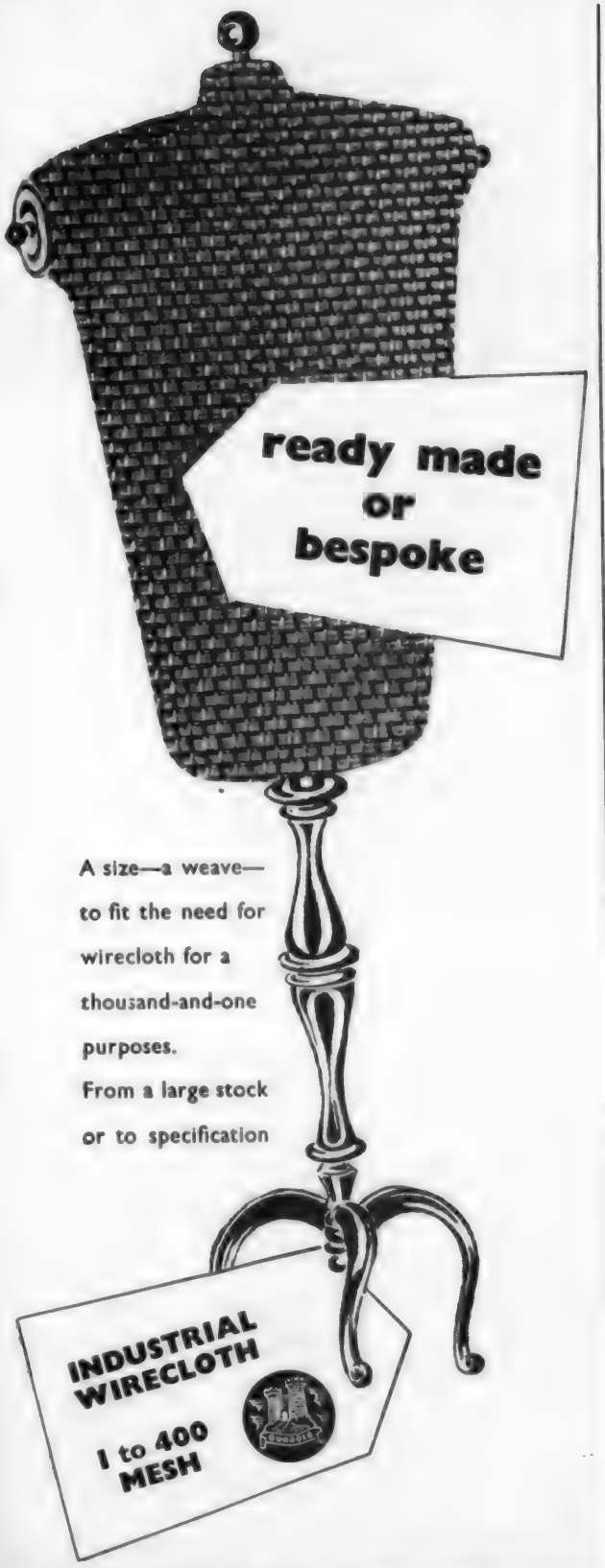

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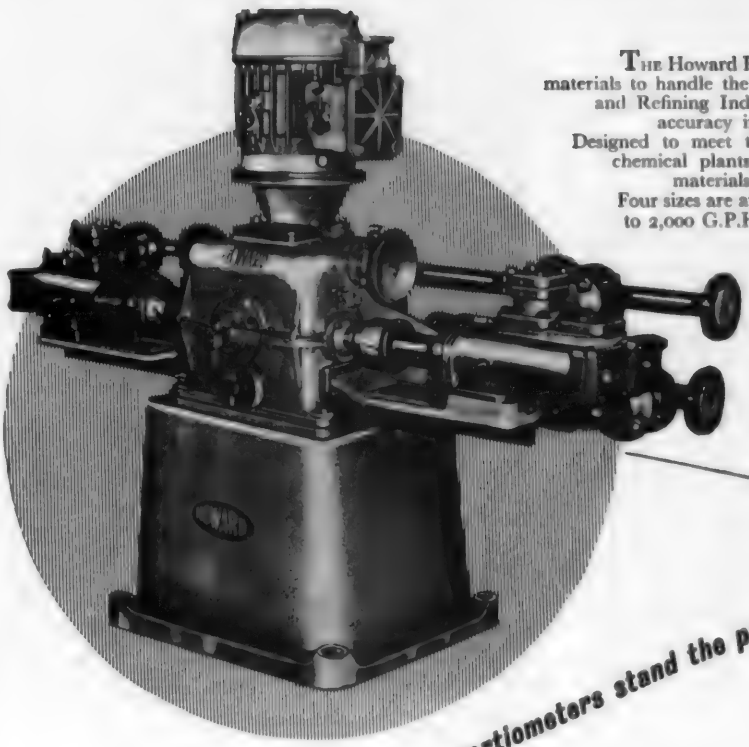

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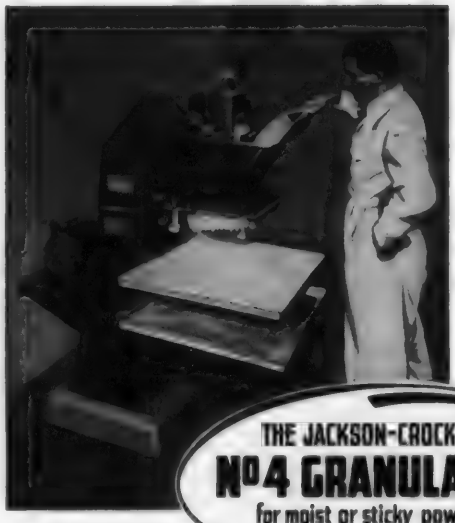

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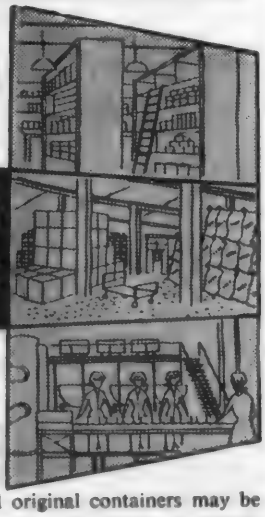

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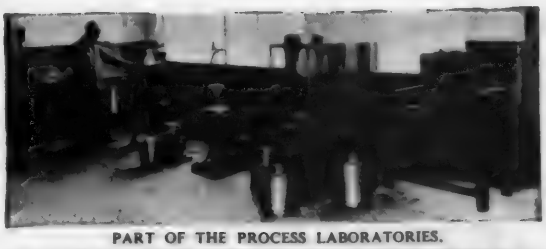

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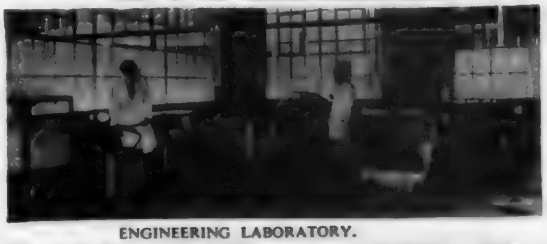

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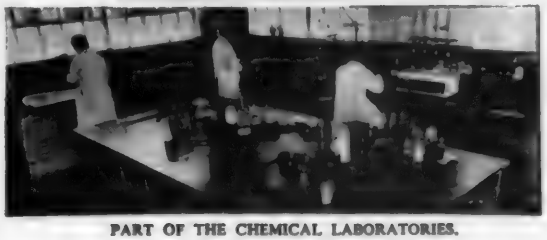

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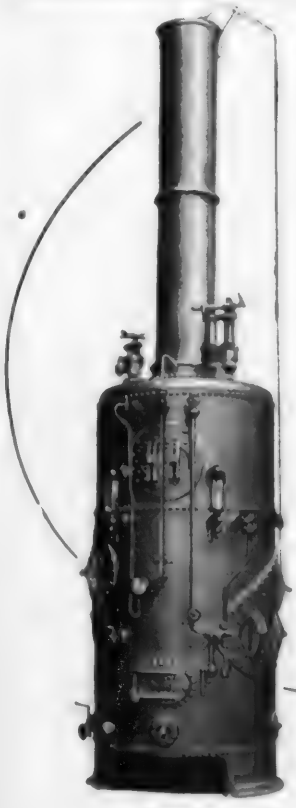

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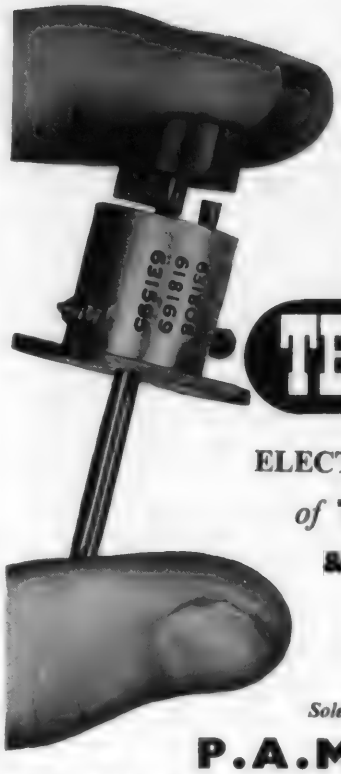

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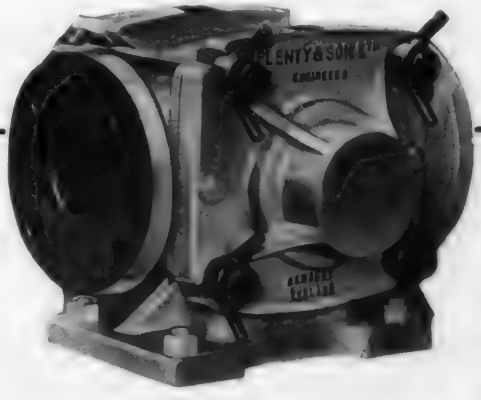

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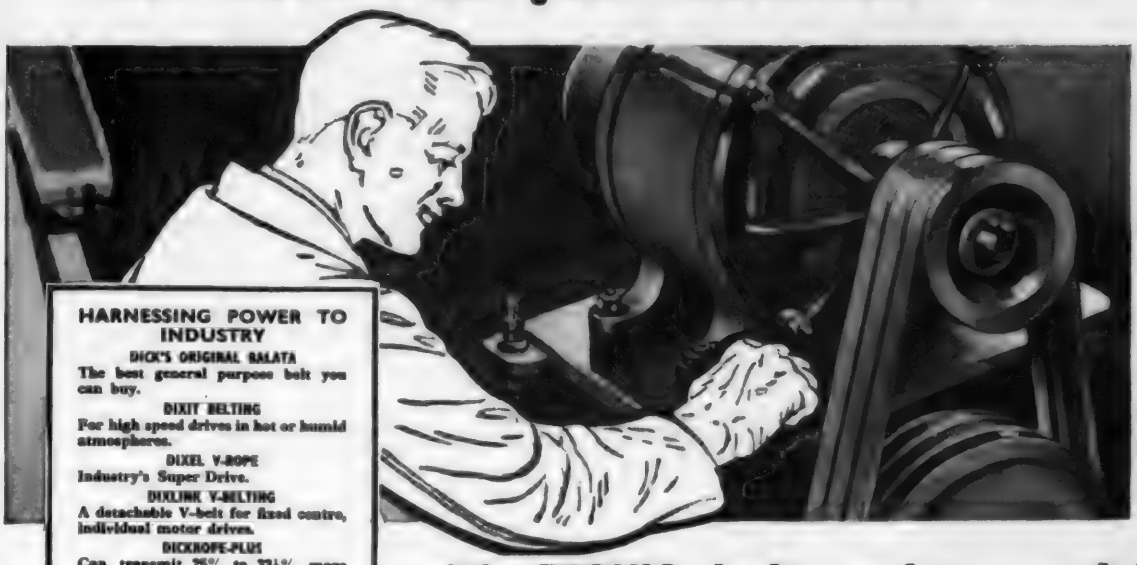

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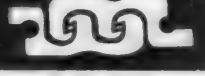

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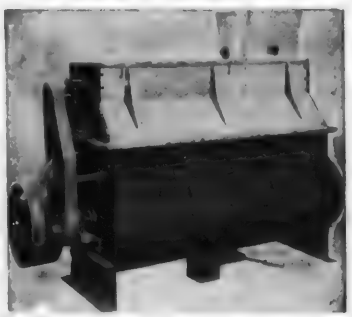

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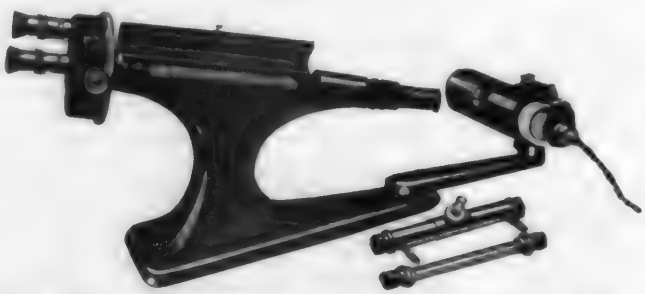

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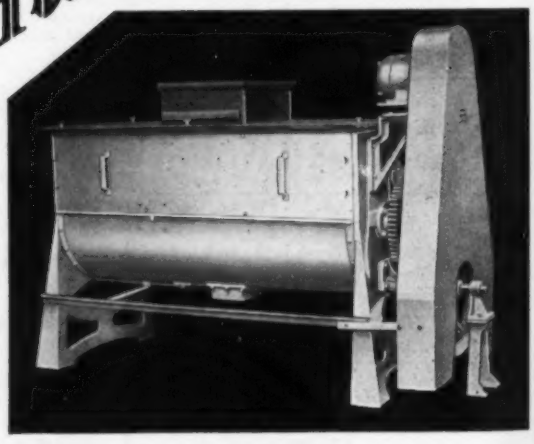

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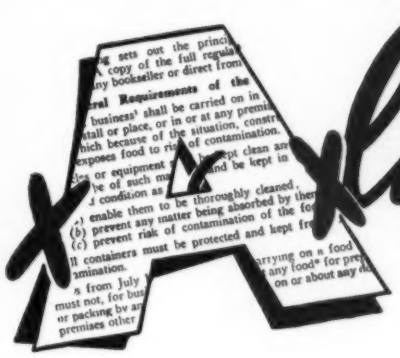
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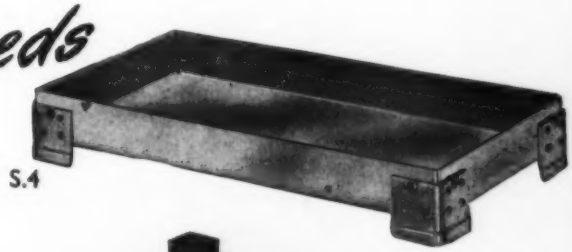
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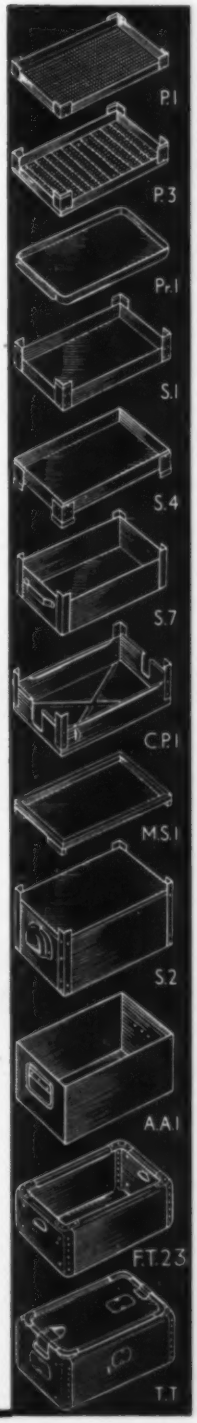

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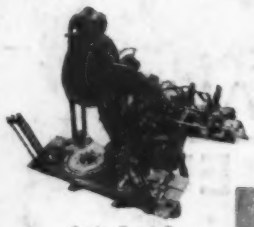

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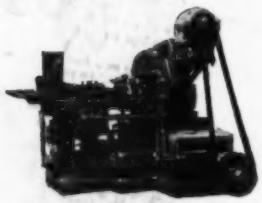

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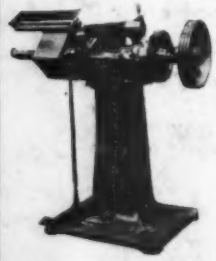

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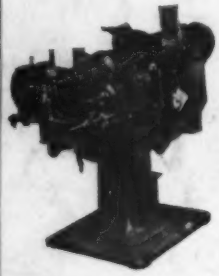

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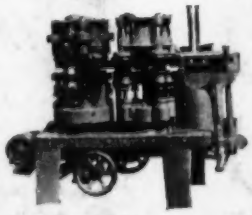

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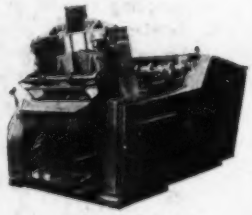

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